Erler & Kalinowski, Inc.
Consulting Engineers and Scientists
1870 Ogden Drive
Burlingame, CA 94010
(650) 292-9100
Fax (650) 552-9012

LETTER OF TRANSMITTAL

TO: Devender Narala
California Environmental Protection Agency
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, Ca 94612

DATE: 27 April 2007
PROJECT. NO. A70004.16
SUBJECT: Former Fuel Distribution System Closure Phases II and III

WE ARE SENDING YOU THE FOLLOWING:

- Field Sampling Plan – Former Fuel Distribution System Closure Phases II and III, Presidio of San Francisco, California, dated 27 April 2007.

REMARKS:

Very truly yours,

ERLER & KALINOWSKI, INC.

Michelle K. King Ph.D.
Vice President

COPY TO:

Brian Ullensvang, National Park Service ("NPS")
Bob Boggs, California Department of Toxic Substances Control ("DTSC")
Doug Kern, Restoration Advisory Board ("RAB")
Mark Youngkin, RAB

If enclosures are not as noted, please advise us at once.

27 April 2007

Mr. Devender Narala
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: **Field Sampling Plan – Former Fuel Distribution System ("FDS")**
Closure Phases II and III
Presidio of San Francisco, California

Dear Mr. Narala:

The Presidio Trust ("Trust") is pleased to submit to the Regional Water Quality Control Board, San Francisco Bay Region ("Water Board") the enclosed report, referenced above. The Trust has prepared this Field Sampling Plan ("FSP") for soil sampling and chemical analysis from 119 proposed locations along the former FDS pipeline. These sample locations are along 29 FDS sections with data gaps identified by Erler & Kalinowski, Inc. ("EKI"), on behalf of the Trust, based primarily on a review of the FDS removal report prepared by International Technology Corporation ("IT") on behalf of the U.S. Army Corps of Engineers ("Army") (IT, 1999). The rationale for the sampling presented in Table 2 was discussed in a meeting on 27 February 2007. The sampling results from these FDS sections will be compared to Presidio-specific cleanup levels and evaluated to determine if additional work is necessary or if the section is suitable for closure. This FSP was previously submitted to the Water Board in draft form on 12 January 2007. Changes to this FSP since the last submitted draft include the following:

- Incorporation of soil sampling data collected by the Trust in 2004 during a utility trench excavation in the vicinity of FDS Section MT-2;
- Addition of 10 soil sampling locations at FDS Section MT-2 to investigate the lateral and vertical extent of total petroleum hydrocarbons ("TPH") previously observed in the utility trench excavation and in oily seeps adjacent to the former FDS pipeline near Hoffman Street;
- Incorporation of soil sampling data collected by Treadwell and Rollo, Inc. in 2004, as part of the excavation of a utility line adjacent to former FDS Section BR5-2;
- Reorganization of figures, with original FDS removal program figures by IT placed immediately behind FSP figures with proposed sampling locations;
- Clarification that TPH quantified as motor oil is in the same carbon range (C24 to C36) as TPH quantified as fuel oil; and

34 Graham Street, Post Office Box 29052, San Francisco, California 94129-0052
415/561-5300 fax 561-5315 presidio@presidiotrust.gov

- Specification that soil samples are to be collected within two feet of the former FDS pipeline, where applicable;

The Trust is in the processes of preparing an addendum to this FSP to address the Infantry Terrace area, which will include FDS Section MT-14. The Infantry Terrace area will include former FDS Section MT-14, as well as underground storage tanks ("USTs") currently addressed under the Mini-Corrective Action Program ("Mini-CAP") program, including USTs 334, 338.1, 339, 342, and 343. The Trust will submit the addendum shortly; at this point, all field work is planned to be conducted in the same mobilization.

Please contact me at (415) 561-4259 if you have any questions.

Sincerely yours,
The Presidio Trust

Craig Cooper
Remediation Program Manager

Enclosure

cc (with enclosure):
Brian Ullensvang, National Park Service ("NPS")
Bob Boggs, California Department of Toxic Substances Control ("DTSC")
Doug Kern, Restoration Advisory Board ("RAB")
Mark Youngkin, RAB

Erler & Kalinowski, Inc.
Consulting Engineers and Scientists
1870 Ogden Drive
Burlingame, CA 94010
(650) 292-9100
Fax (650) 552-9012

27 April 2007

Mr. Craig Cooper
Presidio Trust
34 Graham Street
Post Office Box 29052
San Francisco, California 94129-0052

Subject: Field Sampling Plan – Former Fuel Distribution System ("FDS")
Closure Phases II and III
Presidio Trust, San Francisco, California
(EKI A70004.16)

Dear Mr. Cooper:

Erler & Kalinowski, Inc. ("EKI") is pleased to present this Field Sampling Plan ("FSP") for the investigation of data gaps at 29 Fuel Distribution System ("FDS") sections removed as part of the U.S. Army Corps of Engineers FDS removal program. If you have any questions please do not hesitate to call.

Very truly yours,

ERLER & KALINOWSKI, INC.

Zita Maliga
Project Geologist

John DeWitt, P.E.
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN THOMAS DE WITT
C055468
Exp. 12/31/08
CIVIL
STATE OF CALIFORNIA

Michelle King, Ph.D.
Vice President

Field Sampling Plan –
Former Fuel Distribution System
Closure Phases II and III

Presidio of San Francisco,
California

27 April 2007

Prepared for:

The Presidio Trust
San Francisco, California

Prepared by:

Erler & Kalinowski, Inc.
Burlingame, California

EKI A70004.16

Field Sampling Plan - Former Fuel Distribution System
Closure Phases II and III
Presidio of San Francisco, California

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1.0 INTRODUCTION

Erler and Kalinowski, Inc. ("EKI"), on behalf of the Presidio Trust ("Trust"), has prepared this Field Sampling Plan ("FSP") for soil sampling and chemical analysis from 119 proposed locations along the former fuel distribution system ("FDS") pipeline. These sample locations are along 29 FDS sections with data gaps identified by EKI based on a review of the FDS removal report prepared by International Technology Corporation ("IT") on behalf of the U.S. Army Corps of Engineers ("Army") (IT,1999). The sampling results from these FDS sections will be compared to Presidio-specific cleanup levels and evaluated to determine if additional work is necessary or if the section is suitable for closure.

2.0 OVERVIEW

During the FDS removal program, the Army divided the FDS into 66 sections. The primary documentation of the removal activities and associated sampling for 60 FDS sections is presented in the three-volume report entitled *Fuel Distribution System Closure Report, Presidio of San Francisco, California*, prepared by IT and dated May 1999. Six additional sections were established by the Army to address sections of FDS pipeline that were historically removed by the Army (prior to the 1930s), with the results of soil investigation activities conducted in 1998 and presented in the report entitled *Additional Investigation of Fuel Distribution Systems* prepared by Montgomery Watson and dated August 1999. Guidelines for the FDS Removal Program were established under Regional Water Quality Control Board, San Francisco Bay Region ("Water Board") Order No. 96-070. Subsequently, this Order was superseded by Water Board Order No. R2-2003-0080, which does not specifically address sampling requirements associated with FDS removals.

On 27 January 2006, the Trust submitted the Closure Certification Report for Phase I FDS sections to the Water Board, which included 27 FDS sections where no additional investigative or remedial work was required (Trust, 2006). As a follow-up to the Trust's Phase I Closure Certification Report, EKI conducted a critical review of the Army's FDS removal program for the remaining 39 FDS sections in order to identify locations where data gaps may exist such that criteria for Water Board closure certification are not met. Based on this critical review, the Trust developed decision logic in order to evaluate the Army FDS removal program and make recommendations to address data gaps found in 29 of the 39 FDS sections not yet submitted to the Water Board for closure. This FSP includes additional soil investigation activities at these 29 FDS sections. An addendum to this FSP, to be submitted shortly, will include additional soil and groundwater investigation activities at FDS Section MT-14. The remaining 9 FDS sections, not addressed in either the FSP or as part of the Trust's Phase I Closure Submittal, were either found to have no further action necessary to meet Water Board closure criteria or are included in existing sites (e.g., Corrective Action Plan ("CAP") or Miniature Corrective Action Plan ("Mini-CAP") sites) being addressed separately by the Trust.

The scope and objectives of this FSP were developed in consultation with the Trust and the National Park Service ("NPS") and were discussed with a Water Board representative and members of the Restoration Advisory Board ("RAB") at a meeting on 21 November 2006. Another meeting was held on 27 February 2007 with the Water Board, the Trust, the NPS, and the DTSC in order to present the draft tables and figures of this FSP and facilitate document review. This FSP is being provided to the Water Board, the Department of Toxic Substances Control ("DTSC"), and members of the RAB for input. Collectively, these parties are referred to as the "stakeholders." The scope of work will be conducted in accordance with the Presidio-wide Quality Assurance Project Plan ("QAPP") (TTEMI, 2001).

3.0 DOCUMENT ORGANIZATION

This FSP builds on existing Army documents and reuses these documents to the extent possible. The index map of the individual FDS sections as well as reproductions of the FDS section maps from IT's report (the figures for this report were prepared by Montgomery Watson, but compiled by IT into the report) are included as figures in this report.[1] The Army posted analytical results along the FDS sections. Rather than reposting the data, EKI has reproduced the Army's figures to include the available Army data with this FSP. Former Army sample locations are also shown on EKI's proposed sampling location figures (Figures 1 through 29). EKI has prepared one figure for each FDS section included in this FSP. To facilitate review, the Army figure follows the numbered EKI figure of the same FDS section.

Table 1 outlines the general decision criteria (Levels I, II, and III) used to evaluate the FDS sections based on Water Board Order 96-070. Table 2 provides a detailed summary of all of the individual FDS sections documenting historic information, comparisons to the Level I, II, and II decision criteria, identified data gaps, and rationale for additional sampling (if appropriate). For tracking purposes, Table 2 includes all 66 FDS sections, including those submitted for Phase I closure in January 2006. Table 3 provides a sample analysis matrix for proposed soil samples identified in Table 2 and shown on Figures 1 through 29. The abbreviations used throughout the FSP are identified in Appendix A. Appendix B presents the decision logic used to evaluate data gaps and determine if additional sampling is appropriate. Appendix C contains copies of applicable Trust standard operating procedures from the QAPP. Appendix D contains copies of the soil cleanup level tables from Water Board Order No. R2-2003-0080 and a summary table of applicable cleanup level s for each FDS Section.

4.0 BACKGROUND

The Presidio of San Francisco is located in the northwestern tip of San Francisco, and is bounded by the San Francisco Bay to the north, the Pacific Ocean to the west, and densely populated urban areas to the south and east. It was acquired by the Army in 1846 and used as an Army installation until 1988. The Army developed a large portion of the

[1] Detailed maps of selected excavation areas are not included in this report.

Presidio, constructing a number of administrative, residential, and maintenance buildings. Circa 1900, the Army constructed a FDS to supply heating fuel to residential and administrative buildings located throughout the Presidio.

The FDS network primarily transported heating oil, mostly fuel oil, to heat buildings. Fuel oil was brought to the Presidio by ship and pumped from the dock located in the Building 900's area up to a large aboveground storage tank ("AST"), AST 1349, located in the west-central portion of the Presidio. From there, fuel oil was gravity fed to buildings via the FDS pipeline network. The Army's FDS pipeline removal index map shows the FDS lines and section names. The actual basis for the naming designations was not discussed in the Army FDS removal report. It should be noted that the FDS section names and lengths were likely assigned by the Army during the removal process, and the length of each section is a function of the area covered by the plan view as presented in the Army's figures. It is assumed that "MT" stands for main trunk section of FDS line, with consecutive FDS section numbering started at the edge of the aforementioned dock (at section MT-1) and going uphill to AST 1349 (Army sections MT-2 to MT-6). From AST 1349, the main trunk went east to the Main Post area (Army sections MT-7 to MT-12) and from there it ran along the southern and western side of the Main Post area (Army sections MT-13 to MT-17). Several "branching" FDS sections are designated with the prefix "BR" followed by a number. The nomenclature used to identify branching FDS sections is nonsequential and appears to be loosely defined. The FDS pipelines ranged between 2 and 6 inches in diameter; naming designations do not correlate to pipeline diameter. Unnamed lateral pipelines ("laterals") extended off the main pipeline and fed approximately 300 underground storage tanks ("USTs") located within or near buildings heated by fuel oil. Additionally, gasoline and diesel were reported to be present in FDS pipelines located within the Crissy Field area, designated with the prefix "CF" (FDS Sections CF-1 to CF-4, CF-6 to CF-7 and CF-11 to CF-12). FDS sections CF-8 to CF-10 likely carried fuel oil.

On the western side of the Presidio, sections of FDS removed prior to the 1930s are designated as either Area 5 or Area 6, with adjoining FDS sections assigned a letter designation.

The Army decommissioned the FDS from the early 1940's through the early 1960's. In October 1994, the Presidio was transferred to the NPS, and the Site became part of the Golden Gate National Recreation Area ("GGNRA"). As a condition of transfer, the NPS accepted administrative responsibility of the Presidio, while the Army retained responsibility for environmental investigation and restoration. In 1996, Congress enacted the Presidio Trust Act creating the Presidio Trust and giving the Trust jurisdiction of Area B. In May 1999, the Trust assumed the responsibility for remediation of both Areas A and B (with stated exceptions). The Trust is proposing this sampling plan to meet Water Board requirements for closure of the Army's FDS system.

The FDS removal program was conducted from 1996 to 1999 under oversight by the Army under Water Board Order 96-070. Approximately 45,000 feet ("ft") of FDS pipeline were removed. Sections that could not be removed (due to buildings or other

obstructions) were pressure tested and capped at both ends. The removal program included the removal of all accessible lengths of pipeline as wells as confirmation soil sampling of the following:

- Stockpiled soil was generally to be sampled at a frequency of 50 cubic yards ("cy") / one 4-point composite soil sample for the FDS removal program as a whole, not for each individual FDS section;
- Along trenches where pipeline was removed, soil samples were to be collected from the bottom of the trench at a frequency of 100 linear feet ("lf") / sample and also at the ends of pipeline, at changes in direction, and at intersections with lateral pipeline per Water Board Order 96-070;
- In soil located along lengths of pipeline abandoned in place ("abandoned pipeline"), soil was to be sampled at a frequency of 50 lf / sample per Water Board Order 96-070 as well as at both ends of abandoned pipeline;
- At sidewalls and bottoms of overexcavations conducted as part of the pipeline removal, soil samples were to be collected at a frequency 15 lf / 2 samples, with one sample to be collected on either side of the excavation, or at a frequency of 7.5 lf / sample.

Confirmation soil samples ("CSS") collected by the Army were analyzed on-site using immunoassay procedures, with ten percent of samples sent to a fixed laboratory for confirmation of analytical results. The Army's results of soil sampling at the 29 FDS sections included in this FSP are posted on the figures. In a few cases, more detailed enlargements of excavation areas and confirmation sampling data were prepared by the Army. These detailed figures are only included if pertinent to the proposed sampling in this FSP.

As part of a remedial measure for petroleum sites presented in Water Board Order 96-070, petroleum affected soil found to be above discharge requirements was either disposed offsite or treated using Low-Temperature Thermal Desorption ("LTTD") by heating soil to between 600 and 700 degrees Fahrenheit to volatilize organics (i.e., petroleum hydrocarbons, PAHs, and BTEX). Stockpiled soil reported to be below discharge requirements or batches of LTTD-treated soil were used to backfill FDS excavations to approximately 18 inches below ground surface ("bgs"), with imported topsoil used to backfill the top 18 inches of the trench or overexcavation. Batches of LTTD-treated soil placed along FDS sections were identified by their postpile number (e.g., POST 37) or their range number, which was a batch of LTTD soil that included several postpiles (e.g., RANGE 17 was composed of POST 059, 082, and 083). Post or Range numbers for batches of LTTD-treated soil used to backfill FDS trenches or overexcavations are indicated on the profiles included in the Army's FDS section figures. LTTD-treated soil has a distinct dark brown to blackish color that makes it readily distinguishable from native soil and import or stockpiled soil used to backfill trenches subsequent to FDS pipeline removal.

Based on a review of the FDS removal program, the Army identified 26 sites along the FDS pipeline that needed additional remedial work and 40 FDS sections where no further

remedial action was required. The Army's recommendations for remedial work at the individual FDS sections are identified in Table 2.

The Trust's review of FDS sections differed from the initial Army review for a number of reasons. The Army's evaluation only considered the requirements of Water Board Order 96-070. That Order included a requirement that additional cleanup levels be developed for the freshwater and saltwater ecological protection zones. These cleanup levels have been subsequently developed and incorporated into Order R2-2003-0080. Based on the current EKI's review against the current cleanup levels, EKI found that some areas within these ecological protection zones that had met 1996 cleanup levels may no longer meet the revised cleanup levels. FDS Sections BR10-1, BR10-2, BR10-3, BR13-1, BR13-2, and BR15-1 are located in the freshwater ecological protection zone. FDS Sections CF-4, CF-8, CF-9, CF-10, and MT-1 are located in the saltwater ecological protection zone. Additionally, the Trust has initiated CAPs and Mini-CAPs at a number of sites identified by the Army. The Trust's evaluation of the FDS removal program, tabulated in Table 2, is based on the Army's original remedial objectives as well as the current site-specific requirements and available data at each FDS section.

5.0 DATA GAP ANALYSIS

Information used to evaluate the effectiveness of the Army's FDS removal program is presented on the Army's FDS section figures and in Table 2. On each of the Army's FDS section figures, the top panel presents a plan view map with historical soil sampling locations and posted concentrations of immunoassay and laboratory analytical results. The bottom panel presents an elevation profile of the section and indicates if (and where) LTTD-treated soil was used to backfill the trench or overexcavation to 18 inches bgs. The Army also stockpiled soil during pipeline removal activities. These soil stockpiles were generally tested before reuse as backfill for the trenches. The information about soil stockpiles, including volume, testing frequency, and analytical results are contained in the text of the IT report and are not shown on the Army's figures.

Using the data from the IT report, each FDS section was evaluated against the three levels of decision criteria identified in Table 1. The results of evaluation for each section are summarized in Table 2. Level I Decision Criteria compare applicable cleanup levels to concentrations of COCs detected in confirmation soil samples, stockpile soil samples, and LTTD-treated soil samples characterizing backfill. Level II Decision Criteria compare sampling frequencies for stockpiled soil, overexcavations, and confirmation soil samples, as well as pressure-testing requirements for abandoned pipelines with the specific criteria from the Water Board Order or the Army's practice during the FDS removal program, as described in the IT Report. Level III Decision Criteria are more subjective, with the presence of potential impacts to groundwater evaluated on a case by case basis. For each section, criteria that were not met as part of the Army's FDS removal program are highlighted to facilitate review. Additional remedial work conducted by the Trust or information detailing the reason remedial criteria for each FDS section were not met is described in the "Remarks" column in Table 2.

As shown in Table 1, the three levels of decision criteria indicate that additional sampling or evaluation is required if the decision criteria are not met. To facilitate the process of consistently determining what samples are appropriate to address the data gaps identified by the decision criteria, decision logic was developed, and is included as Appendix B. This decision logic is a sequential step-wise process that incorporates the results of the evaluation of Levels I through III Decision Criteria (tabulated in the middle side columns of Table 2). As part of the decision logic, the following parameters are evaluated:

- Army recommendation;
- Applicable cleanup levels;
- Additional investigation or remediation data collected by the Trust since completion of the IT Report;
- Confirmation sample frequency and results from the trench and LTTD-treated soil;
- Stockpile soil sample frequency and results;
- Abandoned pipeline sampling and pressure testing frequency and results; and
- Overexcavation sampling frequency and results.

For each FDS section, the decision logic was followed to evaluate the available data and to determine if additional sampling is required. The soil samples to be collected based on decision logic criteria are described in the column "Trust Recommendations for Proposed Future Work" in Table 2, and the proposed sample locations and types are shown on Figures 1 through 29. The number of laboratory analyses to be conducted for samples from each FDS section is totaled in the columns on the far right of Table 2. Table 3 presents a summary of the proposed sample collection by FDS section, including sample identification names, depths, soil type (LTTD-treated soil, overburden soil, or native soil), and analyses.

Proposed soil sampling along historic FDS lines is divided into two samples types: soil samples ("SS") and CSS. CSS proposed by the Trust are herein defined as samples to be collected to address uncertainties in the data reported in the IT Report, where soil is potentially affected based on (1) the existence of uncertainty in the immunoassay results (e.g., high reporting limits) or (2) the lack of adequate soil characterization as defined in Order 96-070 or the Army's FDS removal program. The "CSS" sample may be collected from native (undisturbed soil) soil, overburden used to backfill the FDS excavations, or LTTD-treated soil used to backfill FDS excavations. Proposed "SS" samples are soil samples to be collected in areas where soil is likely to be above cleanup levels ("> CL"), based on previous immunoassay or lab analytical results collected by the Army. The "SS" samples will be collected only from native soil.[2] These sample designations were created to distinguish areas containing observed data gaps required to fill Water Board Order requirements from areas more likely to have petroleum impacts that may require additional remediation or soil management.

[2] Samples designated as "native" could hypothetically be present in an area with general imported fill. The intent of the "SS" sample is to collect a sample representative of the soil left in place by the Army after completion of the remedial excavation.

6.0 FIELD ACTIVITIES

6.1 Pre-Field Procedures

A pre-field work site walk will be conducted by the Trust and NPS (and any other stakeholder that wishes to attend) to confirm the planned sampling locations, mark agreed-upon sample locations for Underground Service Alert ("USA") and Trust locating services, and discuss potential issues associated with utilities, traffic, access, tenants, native plants, special habitats, and historic structures. A metal detector will be used to attempt to locate lengths of abandoned pipeline to be sampled in forested or other areas where surficial visual cues of the FDS pipeline location are absent (i.e., a patch of more recent asphalt or concrete from adjoining lengths of removed pipeline).

Similar to other Trust projects, activities associated with utility clearance (including utility locating), permitting or other regulatory requirements, and coordinating for the Presidio-specific Trust (and NPS for Area A locations) reviews and compliance activities (e.g., N^2) will be performed and coordinated by the Trust. EKI will notify USA of planned sampling events after sample locations have been marked in the field.

6.2 General Field Procedures

EKI plans to collect soil samples from 119 sample locations along 29 FDS sections as shown on Figures 1 through 29. FDS sections where soil sampling is to be conducted are shown in pink on the index map. Samples will be collected in accordance with the field methods and procedures outlined in Appendix C and as specified in Standard Operating Procedures ("SOP") 001, SOP 009, SOP 013, SOP 014, and SOP 015 of the QAPP (also included as part of Appendix C). The soil samples will be collected using either a hand auger or a direct push drill rig, generally from depths between 1.5 to 3 ft bgs at overburden sampling locations, from 2 to 10.5 ft bgs in native soil sampling locations where a vertical chemical profile is not recommended, and between 9.5 to 23 ft bgs in native soil sampling locations where a vertical chemical profile is recommended. The depths and corresponding laboratory analyses for proposed soil samples are summarized in Table 3.

For sampling locations that are intended to be located close to the FDS pipeline, EKI will attempt to collect the samples within two feet of the former sampling location. Sampling locations may be moved laterally, and within two feet of the former FDS pipeline location, if access limitations are encountered. However, if access limitations preclude EKI from collecting a representative soil sample, EKI will discuss the situation with the Trust, NPS, and Water Board to identify an appropriate plan of action.

Soil samples will be analyzed for the specific chemicals of concern, which may include total petroleum hydrocarbons as fuel oil ("TPHfo") and motor oil ("TPHmo"), polycyclic aromatic hydrocarbons ("PAHs"), and benzene, toluene, ethylbenzene, and xylenes

("BTEX"), depending on the FDS section and identified data gaps. Additionally, groundwater samples will be collected from sampling locations BR3-2SB01, BR6-3SB01, and MT-3SB06 if groundwater is encountered during soil investigation activities. These three borings are planned to be drilled to approximately 20 ft bgs to evaluate a vertical chemical profile for potential impacts to groundwater at these locations.

Upon completion of soil sampling activities, all soil removed from drilled boreholes will be contained in DOT-approved 55 gallon drums and disposed offsite according to federal and state regulations. Overburden soil removed during hand augering activities will be replaced in the hole to the extent possible; no LTTD-treated soil will be replaced in boreholes. Anticipated investigation-derived waste includes containers of investigation-derived soil, cores of asphalt and concrete, and decontamination rinse water as well as plastic bags with used personal protective equipment and non-hazardous trash.

After completion of the soil sampling, PLS Surveys, Inc. of Alameda, California or another licensed surveyor, will survey the soil sample locations.

The soil samples will be analyzed by Curtis & Tompkins Ltd., of Berkeley, California, a State-certified analytical laboratory, on a standard turnaround time. Based on the proposed sampling matrix in Table 3, Curtis & Tompkins will analyze approximately 240 soil samples and 36 QA/QC samples to be collected in accordance with the Presidio QAPP, as described below.

6.3 Field Quality Control Samples

Field duplicates will be collected as part of this investigation. A field duplicate is a sample collected at the same time and from the same source and depth as the associated primary sample. Field duplicate pairs are collected to assess the consistency or precision of the laboratory's analytical system. The QAPP specifies a frequency of 10% for field duplicates; therefore, 24 field duplicate samples will be collected and submitted to the laboratory for analysis.

Additionally, 12 matrix spike / matrix spike duplicate ("MS/MSD") samples will be collected and submitted to the laboratory for analysis according to the QAPP, which specifies a frequency of 5% for MS/MSD samples. MS/MSD samples are collected to assess the effects of the sample matrix on the lab analytical results.

7.0 ANALYTICAL METHODS

Analytical methods proposed for soil samples include the following:

- TPH as diesel ("TPHd") and TPHfo[3] with silica gel cleanup by EPA Method 8015M.[4]

[3] Carbon range quantified for TPHfo is C24 to C36, which is the same as a typical motor oil range.
[4] The reported carbon ranges for TPHd and TPHfo are C12 to C24 and C24 to C36, respectively.

- PAHs by EPA Method 8270C
- BTEX by EPA Method 8021

The analytical quality control criteria are provided in the QAPP. The laboratory will provide U.S. EPA Level III data report packages, including a narrative explanation of any discrepancies from the standard analytical methods, as identified in the QAPP. To comply with the QAPP, at least ten percent of the data will be reported in Level IV format to meet data validation requirements. Analytical data will be validated by DataVal, Inc.

8.0 SCHEDULE

Field work activities will commence upon stakeholder approval of this Field Sampling Plan and coordination with the Trust, the drilling subcontractor and field staff. It is anticipated that the soil sampling activities will be completed in 15 working days. A field sampling report presenting sample results will be prepared after receipt of the validated analytical data.

9.0 REFERENCES

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Table 1
General Decision Criteria for Determination of Additional Work to be Conducted at Individual Fuel Distribution System Sections
Presidio of San Francisco, California

Level I Decision Criteria

If:

* Chemical concentrations in confirmation soil samples are above applicable cleanup levels (i.e., TPH, PAHs, or BTEX), [a]
* Chemical concentrations in stockpile soil samples are above applicable cleanup levels for TPH, PAHs, or for BTEX and such stockpiled soil was used as backfill; and/or
* Chemical concentrations in LTTD treated soil are potentially above applicable cleanup levels and such LTTD-treated soil was used to backfill trenches or excavations,

Then:

* Collect soil samples or confirmation soil samples to assess horizontal and vertical extent of affected soil.

Else:

* Go to Level II Criteria.

Level II Decision Criteria [b]

If:

* Removed pipeline confirmation soil sampling frequency was greater than 100 lf/sample;
* Abandoned pipeline sampling frequency was greater than 50 lf/sample;
* Overexcavation confirmation soil sampling frequency was greater than 7.5 lf/sample;
* Confirmation soil samples were not collected at each overexcavation;
* Stockpile soil sampling frequency was greater than 50 cy/sample where soil was used as backfill [c];
* Abandoned lengths of pipe greater than 20 lf were not pressure tested; and/or
* Abandoned piping failed pressure testing criterion.

Then:

* Collect confirmation soil samples as appropriate to address data gaps. The need for sampling is often dictated by the presence of visually contaminated soil or the performance of overexcavation along the FDS section.

Else:

* Go to Level III Criteria.

If:

* Potential groundwater impacts may exist (e.g., high chemical concentrations at depths greater than 10 ft bgs where groundwater may be relatively shallow).

Then:

* Evaluate chemical concentrations as a function of depth at sample location where petroleum hydrocarbons could potentially impact groundwater.

Table 1
General Decision Criteria for Determination of Additional Work to be Conducted at Individual Fuel Distribution System Sections
Presidio of San Francisco, California

Abbreviations:
BTEX - Benzene, toluene, ethylbenzene, xylenes
cy - cubic yards
FDS - Fuel Distribution System
ft bgs - feet below ground surface
ft - feet
lf - linear feet
LTTD - Low-Temperature Thermal Desorption
PAHs - Polycyclic Aromatic Hydrocarbons
RWQCB - Regional Water Quality Control Board
TPH - Total Petroleum Hydrocarbons
TPHd - Total Petroleum Hydrocarbons quantified as diesel
TPHfo - Total Petroleum Hydrocarbons quantified as fuel oil

Notes:

(a) Applicable cleanup levels used by the Army were obtained from former RWQCB Order 96-070. The same cleanup levels were incorporated into the current Order for the Presidio, RWQCB Order R2-2003-0080. The current Order also includes cleanup levels for petroleum hydrocarbons and related constituents for sites within the saltwater and freshwater ecological protection zones. Application of the freshwater ecological protection zone values is described in the document prepared by BBL, entitled "Draft Development of Freshwater TPHd and TPHfo Point of Compliance Concentrations, Presidio of San Francisco, California" and dated 15 July 2005.
(b) Level II Decision Criteria originate from the testing and sampling requirements included in former RWQCB Order 96-070.
(c) Stockpiled soil potentially used as backfill was overburden soil from the removal of FDS piping. If chemical concentrations in stockpiled soil were greater than applicable cleanup levels, stockpiled soil was supposed to be either treated at the LTTD unit or disposed off-site.

Table 2
Evaluation of Data Gaps in Fuel Distribution System Removal Program
Presidio of San Francisco, California

					Level I (1)				Level II (2)							Level III (3)				
FDS Closure Phase Number	FDS Section	Area (A/B)	Army Recommendation	Trust Recommendation	CSS Potentially > CL for individual TPH?	CSS Potentially > CL for individual PAHs?	Stockpile CSS Potentially > CL used as Backfill?	LTTD Potentially in Soil > CL?	Removed Pipeline CSS Frequency > 100 ft/sample? (4)	Abandoned Pipeline Sampling Frequency >50 ft/sample? (5)	Overexcavation Sampling Frequency >7.5 ft/sample? (6)	SS at Each Overexcavation?	Stockpile Sampling Frequency > 50 cy/sample or none? (7)	Adequate Pressure Testing? (8)	Pressure Test Failure? (9)	Potential Groundwater Impacts? (10)	Remarks	Trust Recommendations for Proposed Future Work (11)	# Samples Analyzed for TPH (EPA 8015m)	# Samples Analyzed for PAHs (EPA 8270C)	# Samples Analyzed for BTEX (EPA 8021)
Phase I	Area 5 Section A	B	NFA	NFA	no	no	no	no	100	NA	NA	NA	NA	NA	NA	no	CSS collected along trace of previously removed pipeline.	Request for closure submitted to Water Board.	0	0	0
Phase I	Area 5 Section B	B	NFA	NFA	no	no	no	no	92	NA	NA	NA	NA	NA	NA	no	CSS collected along trace of previously removed pipeline.	Request for closure submitted to Water Board.	0	0	0
Phase I	Area 5 Section C	B	NFA	NFA	no	no	no	no	100	NA	NA	NA	NA	NA	NA	no	CSS collected along trace of previously removed pipeline.	Request for closure submitted to Water Board.	0	0	0
Phase I	Area 5 Section D	B	NFA	NFA	no	no	no	no	100	NA	NA	NA	NA	NA	NA	no	CSS collected along trace of previously removed pipeline.	Request for closure submitted to Water Board.	0	0	0
Phase I	Area 6 Section A	B	NFA	NFA	no	no	no	no	100	NA	NA	NA	NA	NA	NA	no	CSS collected along trace of previously removed pipeline.	Request for closure submitted to Water Board.	0	0	0
Phase I	Area 6 Section B	B	NFA	NFA	NA	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	Former pipeline extends along the approach to the Golden Gate Bridge and within the GGBHTD's maintenance yard, and therefore is not accessible for sampling.	Request for closure submitted to Water Board.	0	0	0
TBD	BR1-1	B	CSS	CSS	no	no	no	no	76	53	5.0	yes	190	no	no	no	Stockpiled soil was inadequately sampled and TPH concentrations potentially exceeding cleanup levels (TPH > 100 mg/kg), was transported to LTTD unit for treatment. Trench backfilled with LTTD soil. A 105 ft length of abandoned pipeline was not pressure tested and was inadequately sampled.	Collect two CSS from the overburden at 2 ft bgs (approximately 50 cy/sample for stockpiled soil) along the removed FDS pipeline and analyze for TPH. Collect one native CSS at 4.5 ft bgs along 105 ft length of abandoned piping and analyze for TPH and PAHs.	3	1	0
TBD	BR1-2	B	Mini-CAP	SS	yes	yes	no	no	24	NA	5.0	yes	53	NA	NA	no	TPH and PAH concentrations in confirmation soil samples exceed cleanup levels at overexcavations adjacent to Buildings 1206 and 1207. The excavation extents were limited by the adjacent buildings.	Collect ten native SS at 3 and 6.5 ft bgs within or near the overexcavations adjacent to Buildings 1206 and 1207 and analyze for TPH and PAHs. Additionally, the stockpile sampling frequency slightly exceeds 50 cy/sample. However, no CSS are recommended by EKI at this time because the stockpile sampling frequency is close to the required number.	10	10	0
Phase I	BR2-1	B	NFA	NFA	no	no	no	no	142	NA	NA	NA	130	NA	NA	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil and removed piping is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	BR2-2	B	NFA	SS	yes	yes	no	no	91	48	NA	NA	83	yes	no	no	One CSS, representative of soil remaining in place, potentially exceeds cleanup levels (> 575 mg/kg TPH and > 5 mg/kg PAHs). Access restrictions due to the presence of Building 1220 were cited as the reason for lack of remediation.	Collect two native SS at 3 ft bgs and one native SS 3 and 6 ft bgs and analyze for TPH and PAHs.	4	4	0
Phase I	BR2-3	B	NFA	NFA	no	no	no	no	40	17	6.3	yes	87	yes	no	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels and stockpile was disposed offsite. Therefore, the low sampling frequency observed in stockpiled soil is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	BR3-1	B	Mini-CAP	CSS, SS	yes	yes	no	no	44	56	5.3	yes	20	yes	yes	no	PAH and TPH concentrations in confirmation soil samples exceed cleanup levels next to Building 1224, 1241, and 1244. In each case, the excavation was limited by the adjacent building. A 75 ft length of piping beneath Building 1241 failed pressure testing criterion but was sampled at both ends.	Collect three native CSS at soil sample locations potentially > CL. Evaluate the vertical extent of potentially affected soil by collecting a native SS five feet below each CSS and analyze for TPH and PAHs. Analyze for PAHs only at sample locations BR3-1SB01 and BR3-1SB03. Analyze for TPH and PAHs at sample location BR3-1SB02.	2	6	0
TBD	BR3-2	B	Mini-CAP	SS	yes	yes	no	no	99	NA	3.8	yes	19	NA	NA	no	PAH and TPH concentrations in CSS exceed cleanup levels in the excavation adjacent to tree #5231. The excavation extent was limited by the tree.	Additional excavation would require tree removal. In lieu of tree removal, collect three native SS at 9.5, 14.5, and 19.5 ft bgs to assess vertical extent of affected soil remaining in place and analyze for TPH and PAHs.	3	3	0
Phase I	BR3-3	B	NFA	NFA	no	no	no	no	65	17	NA	NA	10	yes	no	no	--	Request for closure submitted to Water Board.	0	0	0
Phase I	BR3-4	B	NFA	NFA	no	no	no	no	53	NA	NA	NA	97	NA	NA	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
Phase I	BR3-5	B	NFA	NFA	no	no	NA	no	73	NA	NA	NA	none	NA	NA	no	No stockpile samples collected for 97 cy of stockpiled soil used to backfill trench. Confirmation soil samples in trench were <CLs and no visibly stained soil was encountered; no overexcavations conducted. Therefore, the lack of stockpiled soil samples is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
Phase I	BR4-1	B	NFA	NFA	no	no	no	no	70	20	14.0	yes	50	yes	yes	no	Pipeline failed pressure testing, but was sampled with adequate frequency. The overexcavation was adequately sampled as part of the FDS MT-7 pipeline removal. Therefore, the section appears to be adequately characterized.	Request for closure submitted to Water Board.	0	0	0

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FDS Closure Phase Number	FDS Section	Area (A/B)	Army Recommendation	Trust Recommendation	Level I (1)				Level II (2)							Level III (3)	Remarks	Trust Recommendations for Proposed Future Work (11)	# Samples Analyzed for TPH (EPA 8015m)	# Samples Analyzed for PAHs (EPA 8270C)	# Samples Analyzed for BTEX (EPA 8021)
					CSS Potentially > CL for individual TPH?	CSS Potentially > CL for individual PAHs?	Stockpile CSS Potentially > CL used as Backfill?	LTTD Potentially in Soil > CL?	Removed Pipeline CSS Frequency > 100 lf/sample? (4)	Abandoned Pipeline Sampling Frequency >50 lf/sample? (5)	Overexcavation Sampling Frequency >7.5 lf/sample? (6)	SS at Each Overexcavation?	Stockpile Sampling Frequency > 50 cy/sample or none? (7)	Adequate Pressure Testing? (8)	Pressure Test Failure? (9)	Potential Groundwater Impacts? (10)					
TBD	BR5-2	B	Mini-CAP	CSS, SS	yes	yes	no	no	77	9	5.0	yes	275	yes	no	no	PAH and TPH concentrations in CSS are > CL in the vicinity of Building 1328 (TPH > 1,420 mg/kg and PAH > 5.0 mg/kg in Army sample FB05006L01). T&R collected soil samples from this same area when stained soil was encountered during the excavation of a utility trench in 2004 (TPHd = 8,000 mg/kg and TPHfo = 6,600 mg/kg in T&R soil sample 1326FDS EX101[2]). Access to additional soil excavation was limited by an active high pressure natural gas pipeline "gas pipeline") which runs parallel to the utility trench excavation (T&R, 2004). TPH concentrations may potentially exceed cleanup levels in native soil at the lateral near Building 1326 (TPH <1,420 mg/kg in soil sample FB05007T01). Additionally, the stockpile sampling frequency is inadequate and uncertainty exists as to whether LTTD soil or stockpiled soil potentially > CL was used to backfill the trench between Station 9+00 and Station 11+00 .	Collect six native SS at 2, 2.5 and 5.5 ft bgs to define lateral and vertical extent of affected soil at Bldg 1328 and analyze for TPH and PAHs. Collect one native CSS at 2.5 ft bgs at the end of the lateral near Building 1326 and analyze for TPH. Collect two overburden CSS at 1.5 ft bgs betweens Station 9+00 and Station 11+00 and analyze for TPH and PAHs to achieve a frequency of 100 lf/sample.	9	8	0
TBD	BR5-3	B	CSS	CSS	no	no	NA	no	84	71	5.0	yes	none	yes	yes	no	A 105 ft length of pipeline near Building 1308 and 1310 failed pressure testing criteria and was not sampled at one end. No stockpile samples were collected for 257 cy of stockpiled soil used as backfill. However, the portion of the trench associated with stained soil was backfilled with LTTD soil, and remaining trench length was shallow (~2.5 ft bgs) therefore trench backfill was mainly composed of imported soil (from 0 to 1.5 ft bgs) and no visibly stained soil was collected in area of trench backfilled with stockpiled soil. Significant lengths of lengths of FDS pipeline were abandoned in place due to concerns that the integrity of an adjacent gas line would be compromised. These lengths were deemed inaccessible.	Collect two CSS at 2.5 ft bgs along the length of 105 ft abandoned pipeline that failed pressure testing criterion. Collect two native CSS at 2.5 ft bgs at the unsampled ends of abandoned pipeline between Buildings 1300 and 1308. Analyze all CSS for TPH and PAHs.	4	4	0
TBD	BR6-1	B	NFA	CSS	no	no	NA	no	74	15	4.3	yes	none	yes	no	no	No soil samples were collected from 133 cy of stockpiled soil from an FDS section were visibly stained soil was encountered, based on the presence of overexcavations conducted near Building 325 and between Buildings 326 and 327.	Collect three overburden CSS from the overburden (approximately 50 cy/sample for stockpiled soil) at 1.5 ft bgs and analyze for TPH and PAHs.	3	3	0
Phase I	BR6-2	B	NFA	NFA	no	no	no	no	96	NA	NA	NA	119	NA	NA	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	BR6-3	B	Mini-CAP	CSS, SS	yes	yes	no	no	46	NA	3.3	yes	50	NA	NA	no	TPH and PAH concentrations in CSS representative of soil remaining in place exceed cleanup levels. Further excavation of soil > ACL was limited by the presence of Building 101 or the historical sewer adjacent to the overexcavation at the corner of Sheridan Avenue and Taylor Road. Based on water levels from nearby well 100GW101, the depth of groundwater is anticipated to be more than 50 feet. Therefore, potential impacts to groundwater are unlikely.	Conduct soil profiling at sample location BR6-3SB01 by collecting three native SS at 10, 15, and 20 ft bgs and analyze for TPH. Collect one native CSS at sample location at BR6-3SB02 at 2.5 ft bgs and analyze for TPH and PAHs. Collect one native CSS at soil sample location BR6-3SB03 at 2.5 ft bgs and analyze for TPH.	5	1	0
Phase I	BR6-4	B	NFA	NFA	no	no	no	no	48	NA	3.8	yes	72	NA	NA	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	BR6-5	B	Commissary/PX CAP	Commissary/PX CAP	yes	yes	no	no	44	24	6.2	yes	42	yes	no	yes	A portion of the FDS section is located at the Commissary/PX Site. Chemical concentrations in CSS representative of soil remaining in place are > CL. Site was addressed as part of the CAP (T&R, 2005).	No further action.	0	0	0
TBD	BR7-1	B	NFA	CSS	no	no	yes	no	44	33	NA	NA	204	yes	no	no	Inadequate number of stockpile soil samples collected and the stockpile soil used as backfill exceeded cleanup levels for PAHs for CSS samples.	Collect seven overburden CSS at 2 ft bgs (approximately 100 lf/sample for removed pipeline) along length of removed pipeline and analyze for PAHs.	0	7	0
TBD	BR7-2	B	NFA	CSS	no	no	NA	no	81	NA	4.0	yes	none	NA	NA	no	No stockpile samples were collected from 66 cy of stockpiled soil at an FDS section were visibly stained soil was encountered and an excavation was conducted.	Collect two CSS from the overburden (approximately 50 cy/sample for stockpiled soil) at 2 ft bgs and analyze for TPH and PAHs.	2	2	0
TBD	BR8-1	B	Building 1065 CAP	Building 1065 CAP	yes	no	no	no	42	NA	4.4	yes	60	NA	NA	no	FDS section is located at the Building 1065 Site. Chemical concentrations in CSS representative of soil remaining in place are > CL. Area was addressed as part of an interim remedial action at the Site.	No further action.	0	0	0
TBD	BR9-1	A	NFA	CSS	no	no	no	no	97	54	NA	NA	38	yes	yes	no	A 197 ft length of abandoned pipeline failed pressure testing, but may not have been capped correctly. Abandoned pipeline was sampled at both ends.	Collect three native CSS, between 4.5 and 6 ft bgs, along length of abandoned piping, where accessible, and analyze for TPH and PAHs.	3	3	0

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FDS Closure Phase Number	FDS Section	Area (A/B)	Army Recommendation	Trust Recommendation	Level I (1)				Level II (2)							Level III (3)	Remarks	Trust Recommendations for Proposed Future Work (11)	# Samples Analyzed for TPH (EPA 8015m)	# Samples Analyzed for PAHs (EPA 8270C)	# Samples Analyzed for BTEX (EPA 8021)
					CSS Potentially > CL for individual TPH?	CSS Potentially > CL for individual PAHs?	Stockpile CSS Potentially > CL used as Backfill?	LTTD Potentially in Soil > CL?	Removed Pipeline CSS Frequency > 100 ft/sample? (4)	Abandoned Pipeline Sampling Frequency >50 ft/sample? (5)	Overexcavation Sampling Frequency >7.5 ft/sample? (6)	SS at Each Overexcavation?	Stockpile Sampling Frequency > 50 cy/sample or none? (7)	Adequate Pressure Testing? (8)	Pressure Test Failure? (9)	Potential Groundwater Impacts? (10)					
TBD	BR10-1	B	Mini-CAP	SS (LTTD), CSS, Bldg 207/231 CAP	yes	yes	no	yes	28	17	7.4	yes	49	yes	no	yes	The FDS Section is within the freshwater protection zone. TPH concentrations in two CSS may potentially exceed freshwater cleanup levels in the overexcavation near Building 220. Additionally, LTTD-treated soil was used as backfill in three overexcavations along Halleck Street, and no post-treatment data are available for this soil. TPH and PAH concentrations in one CSS exceeds freshwater and other cleanup levels at Building 228, where groundwater may also be potentially affected. However, remediation of soil and potentially affected groundwater near Building 228 is being addressed in the Building 207/231 CAP.	Collect two native CSS at 3 ft bgs at sampling locations BR10-1SB02 and BR10-1SB03 and analyze for TPH. Collect five overburden SS within the LTTD-treated soil in excavations along Halleck St. and analyze for TPH, PAHs, and BTEX.	7	5	5
TBD	BR10-2	B	NFA	CSS	yes	no	NA	no	58	5	NA	NA	none	yes	no	no	The FDS Section is within the freshwater ecological protection zone. TPH concentration for one confirmation soil sample is potentially above freshwater cleanup levels. The stockpile is < 50 cy and no visibly stained soil was encountered (i.e. no overexcavations conducted). Therefore, no additional stockpile sampling is needed.	Collect one native CSS at 3 ft bgs at sample location BR10-2SB01 and analyze for TPH.	1	0	0
TBD	BR10-3	B	NFA	SS (LTTD), CSS	no	no	NA	yes	78	NA	3.0	yes	none	NA	NA	no	The FDS Section is within the freshwater protection zone. LTTD-treated soil used as overexcavation backfill and location is within the freshwater protection zone. Specific chemical data are not available for LTTD-treated soil. Therefore, chemical concentrations may be above freshwater cleanup levels. Stockpile is < 50 cy and the Army did not conduct stockpile sampling. Stained soil was encountered during pipeline excavation and an overexcavation was conducted.	Collect one overburden SS at 2.5 ft bgs from LTTD-treated soil at the excavation site and analyze for TPH, PAHs and BTEX. Collect one CSS at 1.5 ft bgs from the overburden and analyze for TPH and PAHs.	2	2	1
Phase I	BR11-1	B	NFA	NFA	no	no	no	no	48	NA	NA	NA	18	NA	NA	no	--	Request for closure submitted to Water Board.	0	0	0
TBD	BR12-1	B	Mini-CAP	SS	yes	no	no	no	33	NA	3.0	yes	16	NA	NA	no	TPH concentrations in confirmation soil samples exceed cleanup levels at the lateral adjacent to Building 59. The excavation extent was limited by a tree adjacent to Building 59.	Additional excavation would require tree removal. In lieu of tree removal, collect three native SS at 2 and 5.5 ft bgs and analyze for TPH to assess vertical and horizontal extent of TPH-affected soil.	3	0	0
TBD	BR13-1	B	NFA	CSS	yes	no	no	no	52	35	6.0	yes	126	no	no	no	The FDS section is within the freshwater ecological protection zone. One confirmation soil sample, representative of soil remaining in place, potentially exceeds cleanup levels for freshwater protection (<1,380 mg/kg at 5 ft bgs). Stockpile soil sampling frequency is > 50 cy and overexcavation was conducted. A 131 ft length of FDS pipeline and the associated lateral between Building 11 and 12 was not pressure tested, but was adequately sampled.	Collected one native CSS at 5 ft bgs at Army sample location FM16111L10, located west of Barnard Ave., and analyze for TPH. Collect two CSS, at 2 ft bgs, from overburden to meet the 50 cy/sample stockpile sampling frequency requirement and analyze for TPH and PAHs.	3	2	0
TBD	BR13-2	B	Mini-CAP	NFA	yes	no	no	no	49	NA	2.2	yes	18	NA	NA	no	The FDS Section is within the freshwater ecological protection zone, but outside the zone of application for freshwater cleanup, and therefore terrestrial cleanup levels are applicable. TPH remaining in soil > CL in the vicinity of Building 748/750 is inaccessible due to the presence of nearby utility lines. Additionally, a Mini-Cap has been conducted in the vicinity of the former UST between buildings 748/750, wherein soil and groundwater was not found to be > CL.	Soil and groundwater in the vicinity of the affected area at Building 748/750 were sufficiently characterized by the Mini-CAP conducted by the Army from 1994-1995 (MW, 1999). Therefore, no further action is recommended.	0	0	0
Phase I	BR14-1	B	NFA	NFA	no	no	no	no	76	NA	NA	NA	57	NA	NA	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	BR15-1	B	NFA	NFA	no	no	no	no	59	4	NA	NA	54	yes	no	no	The FDS Section is within the freshwater ecological protection zone. No visibly stained soil was encountered and CSS were all below cleanup levels. Therefore, it is unlikely that chemicals of concern are inadequately characterized due to low sampling frequency observed in stockpiled soil.	No further action.	0	0	0
TBD	BR16-1	B	NFA	NFA	no	no	no	no	20	NA	NA	NA	4	NA	NA	no	--	No further action.	0	0	0
Phase I	CF-1	A	NFA	NFA	no	no	no	no	71	NA	NA	NA	42	NA	NA	no	--	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-2	A	NFA	NFA	no	no	no	no	36	105	NA	NA	7	no	no	no	Pressure testing could not be conducted as pipe was already cut, and one end of pipeline is inaccessible beneath Building 640.	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-3	A	Building 637 CAP	Building 637 CAP	yes	no	NA	no	46	NA	7.0	yes	none	yes	no	no	Area was remediated as part of 637 CAP, Excavation Area B.	Request for closure submitted to Water Board.	0	0	0
TBD	CF-4	A	Commissary/PX CAP	Commissary/PX CAP	yes	no	no	no	41	NA	NA	NA	48	NA	NA	no	The FDS Section is within the saltwater ecological protection zone. FDS section is located at the Commissary/PX Site. Chemical concentrations in CSS representative of soil remaining in place are > CL. Site was addressed as part of the CAP.	Remediation was addressed as part of the Commissary/PX CAP. No further action is recommended as part of FDS data gap analysis.	0	0	0

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					CSS Potentially > CL for individual TPH?	CSS Potentially > CL for individual PAHs?	Stockpile CSS Potentially > CL used as Backfill?	LTTD Potentially in Soil > CL?	Removed Pipeline CSS Frequency > 100 ft/sample? (4)	Abandoned Pipeline Sampling Frequency >50 ft/sample? (5)	Overexcavation Sampling Frequency >7.5 ft/sample? (6)	SS at Each Overexcavation?	Stockpile Sampling Frequency > 50 cy/sample or none? (7)	Adequate Pressure Testing? (8)	Pressure Test Failure? (9)	Potential Groundwater Impacts? (10)					
Phase I	CF-6	A	NFA	NFA	no	no	no	no	41	NA	NA	NA	25	NA	NA	no	--	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-7	A	SS	Crissy Field RAP	yes	yes	no	no	77	NA	10.8	yes	45	NA	NA	no	Additional excavation was conducted by the Army as part of the Crissy Field RAP and additional sampling was conducted by the Trust in the vicinity of the overexcavation. Therefore, the sampling frequency subsequent to the original FDS removal is < 7.5 ft/sample, and the FDS section is adequately characterized.	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-8	A	NFA	NFA	no	no	no	no	75	NA	NA	NA	87	NA	NA	no	The FDS Section is within the saltwater ecological protection zone. No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-9	A	NFA	NFA	no	no	no	no	89	NA	NA	NA	16	NA	NA	no	The FDS Section is within the saltwater ecological protection zone.	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-10	A	NFA	NFA	no	no	no	no	78	NA	NA	NA	31	NA	NA	no	The FDS Section is within the saltwater ecological protection zone.	Request for closure submitted to Water Board.	0	0	0
Phase I	CF-11	A	NFA	NFA	no	no	no	no	44	NA	NA	NA	11	NA	NA	no	--	Request for closure submitted to Water Board.	0	0	0
TBD	CF-12	A	Commissary/PX CAP	Commissary/PX CAP	yes	no	no	no	56	NA	NA	NA	31	NA	NA	no	FDS section is located at the Commissary/PX Site. Chemical concentrations in CSS representative of soil remaining in place are > CL. Site was addressed as part of the CAP.	Remediation was addressed as part of the Commissary/PX CAP. No further action is recommended as part of FDS data gap analysis.	0	0	0
Phase I	MT-1	A	NFA	NFA	no	no	NA	no	109	109	NA	NA	none	yes	no	no	The FDS Section is within the saltwater ecological protection zone. No visibly stained soil was encountered and CSS were all below cleanup levels. Therefore, the low sampling frequency of stockpiled soil, abandoned piping, and removed piping is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	MT-2	B	CAP	970/971 Mini-CAP, CSS	yes	yes	no	no	21	55	10.7	yes	47	yes	no	yes	Chemical concentrations in CSS representative of soil remaining in place may exceed cleanup levels for PAHs at sample location FM02012W02, which is located at the edge of the overexcavation south of Building 951 (C&T, 2004). Visually stained soil and an oily sheen in groundwater seeps were encountered during the excavation of a utility trench along Hoffman Street. One of two soil samples collected from the base of the utility trench exceeded cleanup levels for TPHd (TPHd = 2,900 mg/kg for soil sample 951SS100[2.5]) (C&T, 2004). Additionally, soil exceeding cleanup levels and potential groundwater impacts exist in the vicinity of the overexcavation south of former AST 970, which will be addressed as part of the Building 970/971 Mini-CAP.	Collect one native CSS, at 3.5 ft bgs, at sampling location FM02012W02 and analyze for PAHs. Collect ten native soil samples, at 2.5 and 5.5 ft bgs, in the vicinity of the groundwater seeps with observed oily sheen and analyze for TPHd, TPHfo, and PAHs.	10	11	0
TBD	MT-3	B	CSS	CSS, SS	no	yes	yes	no	62	65	5.0	yes	31	yes	no	yes	PAH concentrations in CSS representative of soil remaining in place potentially exceed cleanup levels for PAHs in soil sample FM03021W03. Stockpile soil is potentially > CLs (concentrations of TPH in 4 out of 8 stockpile samples was TPH > 62.5 mg/kg by immunoassay analysis). The sampling frequency for abandoned piping was inadequate. However, the abandoned piping is located beneath a portion of Highway 101. This section of freeway is very difficult to access. Additionally, potential groundwater impacts may exist near Building 1299 (TPH < 15,000 mg/kg at 12.5 ft bgs at sample location FM03021W06). Depth to groundwater has been measured at 25 to 30 ft bgs in nearby monitoring well 1213GW101.	Collect one native CSS at 4 ft bgs at soil sampling location MT-3SB05 and analyze for PAHs. Collect seven CSS, at 2 or 4 ft bgs, within overburden along the trenchline at 100 lf/sample of pipeline removed and analyze for TPH and PAHs. To assess the extent of affected soil at sample location MT-3SB06, collect one native CSS at 12.5 ft bgs and two native SS at 17.5 and 22.5 ft bgs and analyze for TPH and PAHs.	10	11	0
TBD	MT-4	B	CSS	CSS	no	no	yes	no	126	NA	6.4	yes	95	NA	NA	no	TPH concentrations in one stockpile soil sample collected at Station 24+00 potentially exceeded cleanup levels (> 62.5 mg/kg) was used as backfill near Station 24+00. IT recommended CSS of overburden along trench near Station 24+00. Additionally, CSS along removed trench and stockpiled soil is inadequate.	Collect six overburden CSS at 2 ft bgs along parallel lengths of removed trench between Stations 23+00 and 26+00 (section most likely to have had stockpiled soil > CL used as backfill) and analyze for TPH.	6	0	0
TBD	MT-5	B	CSS	CSS, SS	no	yes	no	no	85	42	7.1	yes	84	yes	yes	no	PAH concentrations in one CSS (FM05035T02) may potentially exceed cleanup levels (> 5.0 mg/kg). A 140-ft length of pipeline failed pressure testing criteria and had inadequate sampling frequency. Stockpile soil was used as backfill only between Stations 37+00 and 39+00. Overburden sampling frequency is close to the required frequency.	Collect one native CSS at 4.5 ft bgs at sample location MT-5SB01 and analyze for PAHs. Collect one native SS between 6 to 8 ft bgs at the center of the 140-ft length of abandoned pipeline and analyze for TPH and PAHs.	1	2	0

Table 2
Evaluation of Data Gaps in Fuel Distribution System Removal Program
Presidio of San Francisco, California

FDS Closure Phase Number	FDS Section	Area (A/B)	Army Recommendation	Trust Recommendation	Level I (1)				Level II (2)							Level III (3)	Remarks	Trust Recommendations for Proposed Future Work (11)	# Samples Analyzed for TPH (EPA 8015m)	# Samples Analyzed for PAHs (EPA 8270C)	# Samples Analyzed for BTEX (EPA 8021)
					CSS Potentially > CL for individual TPH?	CSS Potentially > CL for individual PAHs?	Stockpile CSS Potentially > CL used as Backfill?	LTTD Potentially in Soil > CL?	Removed Pipeline CSS Frequency > 100 ft/sample? (4)	Abandoned Pipeline Sampling Frequency >50 ft/sample? (5)	Overexcavation Sampling Frequency >7.5 ft/sample? (6)	SS at Each Overexcavation?	Stockpile Sampling Frequency > 50 cy/sample or none? (7)	Adequate Pressure Testing? (8)	Pressure Test Failure? (9)	Potential Groundwater Impacts? (10)					
TBD	MT-6	B	Mini-CAP	Building 1349 CAP	yes	yes	yes	no	100	NA	4.8	yes	42	NA	NA	no	FDS section is located at the Building 1349 Site. Chemical concentrations in CSS representative of soil remaining in place were found to be > CL at Station 43 and will be remediated as part of the Building 1349 CAP. TPH concentrations in stockpile soil used to backfill between sampling locations FM06041T01 and FM6042T02 may have exceeded the TPH > 100 mg/kg discharge criteria (TPH > 71 mg/kg). This area was investigated as part of the 1349 CAP and TPH and PAHs concentrations in soil sample 1349SB114/1349SB115 were below cleanup levels (BBL, 2006).	Future remedial action will be conducted as part of the 1349 CAP. No further action is recommended as part of FDS data gap analysis.	0	0	0
TBD	MT-7	B	NFA	Building 1349 CAP	yes	yes	no	no	77	NA	7.3	yes	114	NA	NA	no	Chemical concentrations in CSS representative of soil remaining in place were found to be > CL. Remediation of affected soil will be conducted as part of the Building 1349 CAP (BBL, 2006).	No further action is recommended as part of FDS data gap analysis.	0	0	0
Phase I	MT-8	B	NFA	NFA	no	no	no	no	110	NA	NA	NA	none	NA	NA	no	No visibly stained soil was encountered and chemical concentrations in CSS were all below cleanup levels. Therefore, the low sampling frequency observed in stockpiled soil and removed piping is not likely an issue.	Request for closure submitted to Water Board.	0	0	0
TBD	MT-9	B	NFA	CSS	no	no	NA	no	82	30	4.8	yes	none	no	no	no	No stockpile samples were collected from 110 cy of stockpiled soil from a FDS section were visibly stained soil was encountered and an excavation was conducted. Pressure testing was not conducted at one 60 ft length of abandoned pipeline, but both ends were sampled and sampling frequency for abandoned piping is adequate.	Collect three CSS from the overburden (approximately 50 cy/sample for stockpiled soil) at 2 ft bgs and analyze for TPH and PAHs.	3	3	0
TBD	MT-10	B	Mini-CAP, CSS	SS	yes	yes	no	no	91	NA	NA	NA	202	NA	NA	no	CSS representative of soil remaining in place potentially exceeds cleanup levels (> 575 mg/kg TPH and > 5 mg/kg PAHs) at soil sample location FM10068T01. Additionally, IT recommended CSS of overburden material due to TPH at 130 mg/kg, which is above discharge criteria (> 100 mg/kg) for stockpile soil. However, this TPH concentration is not > CL for TPH remaining in place. Therefore, no additional sampling is recommended for soil above discharge criteria.	Collect one native SS, at 0.5 ft bgs, at Station 68+70 (Army soil sampling location FM10068T01) and analyze for TPH and PAHs.	1	1	0
TBD	MT-11	B	CSS	CSS	no	no	yes	no	74	6	NA	NA	69	yes	no	no	Total carcinogenic PAH concentrations (< 6.2 mg/kg) potentially exceed cleanup levels in two out of three stockpile soil samples used as backfill. The third stockpile soil sample was not analyzed by the fixed laboratory. Immunoassay results of stockpile soil samples are inconsistent with lab analytical results.	Collect eight overburden CSS at 2 ft bgs at frequency of 100 lf/sample along length of removed piping and analyze for PAHs.	0	8	0
TBD	MT-12	B	NFA	CSS	no	no	yes	no	59	NA	8.0	yes	109	NA	NA	no	Total carcinogenic PAH concentrations (< 6.2 mg/kg) in stockpile soil sample used as backfill may exceed applicable cleanup level of 5.6 mg/kg. Stockpile soil sampling frequency was inadequate. CSS at overexcavation was very close to acceptable frequency.	Collect four CSS at 2 ft bgs from overburden along length of trench between Station 84+00 and 87+00 (100 lf/sample of trench removed) and analyze for PAHs.	0	4	0
TBD	MT-13	B	NFA	CSS	no	no	NA	no	62	19	8.0	yes	none	yes	no	no	No stockpile samples were collected from an FDS section where 74 cy of stockpile soil was used as backfill and visibly stained soil was encountered and an excavation was conducted. Overexcavation confirmation sampling close to required frequency.	Collect two CSS from the overburden (50 cy/sample for stockpiled soil) at 2 ft bgs and analyze for TPH and PAHs.	2	2	0

Table 2
Evaluation of Data Gaps in Fuel Distribution System Removal Program
Presidio of San Francisco, California

FDS Closure Phase Number	FDS Section	Area (A/B)	Army Recommendation	Trust Recommendation	Level I (1)				Level II (2)							Level III (3)	Remarks	Trust Recommendations for Proposed Future Work (11)	# Samples Analyzed for TPH (EPA 8015m)	# Samples Analyzed for PAHs (EPA 8270C)	# Samples Analyzed for BTEX (EPA 8021)
					CSS Potentially > CL for individual TPH?	CSS Potentially > CL for individual PAHs?	Stockpile CSS Potentially > CL used as Backfill?	LTTD Potentially in Soil > CL?	Removed Pipeline CSS Frequency > 100 ft/sample? (4)	Abandoned Pipeline Sampling Frequency >50 ft/sample? (5)	Overexcavation Sampling Frequency >7.5 ft/sample? (6)	SS at Each Overexcavation?	Stockpile Sampling Frequency > 50 cy/sample or none? (7)	Adequate Pressure Testing? (8)	Pressure Test Failure? (9)	Potential Groundwater Impacts? (10)					
TBD	MT-14	B	CAP, Mini-CAP, CSS	CSS, SS, GW	yes	yes	yes	no	26	40	3.7	no	30	no	yes	yes	FDS section is located at Infantry Terrace. Chemical concentrations in CSS representative of soil remaining in place were potentially >CLs for TPH and PAHs at location FM14094L02 (PAHs >5.0 mg/kg and TPH >575 mg/kg) and FM14097L01 (TPH <3,551 mg/kg and PAHs >5.0 mg/kg). Stockpiled soil with PAH concentrations > CL was used as backfill (PAH = 6.8 mg/kg in stockpile samples FM14095S01 and FM14095S02). Although the overall overexcavation sampling frequency was adequate, only one confirmation soil sample was collected for an excavation 30 feet in length near Building 334. Soil at Overexcavation No. 7 was found to have CSS > CL, near Building 340 and near Building 341, where soil was inaccessible for further excavation. Additional excavation work (45 ft long, 6 ft deep and 8 ft wide) was completed along the western side of the excavation as part of the basement waterproofing of Building 340, and a portion of the affected soil near Building 340 may have been removed. TPH-g and MTBE were detected at concentrations below cleanup levels in groundwater samples collected from wells FM14EX07MW101 and FM14EX07MW102, at a maximum concentration of 9 mg/L and 3.3 mg/L, respectively, in the vicinity of Overexcavation No. 7 (T&R, 2007).	Area to be addressed as part of proposed soil and groundwater investigation at Infantry Terrace, which will be submitted as an addendum to this field sampling plan.	0	0	0
TBD	MT-15	B	CSS	CSS	no	no	no	no	53	35	4.1	yes	35	yes	yes	no	A 167-ft length of abandoned pipeline failed pressure testing, was grouted, and sampled at both ends. Approximately 75 ft of the abandoned pipe length is located beneath Building 45. However, the remaining portion of the pipeline appears to be accessible and was not sampled. A 24-ft section of pipeline located beneath a tree failed pressure testing, and was not sampled at both ends. Additionally, IT recommended CSS of overburden material due TPH exceeding the 100 mg/kg discharge criterion (TPH = 280 mg/kg). However, TPH concentrations are not above applicable cleanup levels and no sampling is recommended in the overburden.	Collect two native CSS at 3.5 ft bgs adjacent to Building 45, for a sampling frequency of 1 sample per 50 ft of abandoned piping. Collect one native CSS at 2.5 ft bgs at the unsampled end of the 24 ft length of piping adjacent to a tree. All samples should be analyzed for TPH and PAHs.	3	3	0
TBD	MT-16	B	CSS	CSS	no	no	yes	no	35	59	NA	NA	20	no	no	no	TPH and PAH concentrations (TPH > 62.5 mg/kg and PAHs > 1 mg/kg) in a portion of stockpiled soil was likely used as trench backfill. Abandoned lengths of lateral piping adjacent to Buildings 11 through 16 were not pressure tested but were sampled at a frequency very close to the acceptable frequency.	Collect three overburden CSS at 1.5 ft bgs between Army samples FM16109L03 and FM16111L01, which likely received stockpiled soil from Army soil samples FM16111S01 and FM16111S02, and analyze for TPH and PAHs (approximately 100 lf/sample).	3	3	0
TBD	MT-17	B	CSS	CSS	no	no	yes	no	33	23	8.0	yes	190	no	no	no	An inadequate number of stockpile soil samples was collected and chemical concentrations in one stockpile soil samples potentially exceeded cleanup levels (TPH > 100 mg/kg). Additionally, pressure testing was not conducted for a 75 ft length of abandoned piping. CSS of the overexcavation was very close to acceptable frequency. This abandoned pipeline was deemed inaccessible due to the presence of trees and utility lines.	Collect nine overburden CSS at 1.5 to 2 ft bgs at approximately 100 lf/sample and analyze for TPH. Accessibility of the 75 ft length of abandoned piping was reassessed, and deemed accessible for the purposes of additional sampling. Collect one CSS, at 2.5 ft bgs, along abandoned piping length and analyze for TPH and PAHs.	10	1	0

Table 2
Evaluation of Data Gaps in Fuel Distribution System Removal Program
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Abbreviations:
- number
> CL - above cleanup levels
Army - U.S. Army Corps of Engineers
BTEX - benzene, toluene, ethylbenzene, xylenes
CAP - Corrective Action Plan
Commissary/PX - Commissary Post-Exchange
CSS - Confirmation Soil Sample
cy - cubic yard
EKI - Erler & Kalinowski, Inc.
FDS - fuel distribution system
ft - feet
GGBHTD - Golden Gate Bridge Highway and Transportation District
IT - International Technology Corporation
lf - linear feet
LTTD - low temperature thermal desorption
NA - not applicable
NFA - no further action
PAHs- polycyclic aromatic hydrocarbons
RAP- Remedial Action Plan
SS - soil sample
T&R - Treadwell & Rollo, Inc.
TBD - closure request phase is to be determined after implementation of FSP or other activities at CAP or Mini-CAP sites.
TPH - total petroleum hydrocarbons
TPHd - total petroleum hydrocarbons as diesel
TPHfo - total petroleum hydrocarbons as fuel oil

Legend
Does not meet selected criteria

Notes:
(1) Additional soil sampling is required for all FDS sections which fail any portion of Level I Decision Criteria (except at FDS sections where additional sampling was performed as part of a CAP or Mini-CAP). Applicable cleanup levels for each FDS Section are included in Appendix D.
(2) Additional soil sampling may be required for FDS sections which fail any portion of Level II Decision Criteria.
(3) An assessment of soil concentration as a function of depth or groundwater sampling is required for FDS sections which fail Level III Decision Criteria, and where additional sampling is not being conducted as part of a CAP or Mini-CAP.
(4) Former Water Board Order 96-070 required a sampling frequency of 100 lf/sample of pipeline removed, including one confirmation soil sample at each end of the removed length of pipeline, one confirmation soil sample at each change in pipeline direction, and one confirmation soil sample at each intersection of the FDS pipeline with lateral piping. CSS collected at a sampling frequency > 100 lf/sample for lengths of removed pipeline are highlighted in gray.
(5) Former Water Board Order 96-070 required a sampling frequency of 50 lf/sample for lengths of accessible abandoned piping. If the piping was inaccessible for sampling, the Army generally collected samples at both ends of abandoned piping. CSS collected at a sampling frequency > 50 lf/sample are highlighted in gray.
(6) The Army planned to sample overexcavation lengths at a frequency of 7.5 lf/sample. Highlighted fields indicate a sampling frequency of > 7.5 lf/sample.
(7) The Army recommended confirmation soil sampling for stockpiled soil at a frequency of 50 cy/sample. FDS sections where stockpiled soil was not sampled are indicated as "none". FDS sections where > 50 cy of stockpiled soil were generated and no samples were collected or FDS sections where the sampling frequency of stockpiled soil was > 50 cy/sample are highlighted in gray. Additionally, FDS sections where no soil samples were collected and < 50 cy of stockpiled soil were generated, but visually stained soil was found at the along the FDS section (as indicated by the presence of overexcavations) are highlighted in gray.
(8) Prior to November 1996, the Army performed pressure testing on lengths of abandoned pipeline > 50 lf and collected confirmation soil samples at a frequency of 50 lf/sample of abandoned piping. Subsequently, this provision was amended and pressure testing was recommended for abandoned lengths of FDS pipeline > 20 lf, with soil samples collected from all exposed ends of abandoned piping. Grouting of all abandoned lengths of FDS pipeline was also recommended. FDS sections where lengths of abandoned piping > 50 lf were pressure tested are considered to have met the decision criteria and are indicated as "yes", otherwise "no" is indicated and the cell is highlighted in gray.
(9) FDS sections where lengths of abandoned piping > 50 lf failed pressure testing are indicated as "yes" and highlighted in gray, otherwise "no" is indicated.
(10) Potential groundwater impacts are based on the presence of significantly affected soil at depth (e.g., > 10 ft bgs), where the reported groundwater at the Site is generally within 15 ft of the affected soil.
(11) For the purposes of this investigation, "overburden" refers to the soil that was excavated by the Army as part of the FDS removal program and was used as trench backfill. "Native" refers to soil that was not excavated by the Army as part of the FDS removal and remediation activities.

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Table 3
Soil Sample Laboratory Analysis Matrix
for Data Gap Analysis of Fuel Distribution System Sections
Presidio of San Francisco, California

FDS Section	Sample Location	Sample Depth (ft bgs)	Soil Type to Sample (a)	Laboratory Analyses		
				TPHfo/TPHd (EPA 8015m)	PAHs (EPA 8270C)	BTEX (EPA 8021)
BR1-1	BR1-1SB01	2	overburden	*		
	BR1-1SB02	4.5	native	*	*	
	BR1-1SB03	2	overburden	*		
BR1-2	BR1-2SB01	3, 6.5	native	*	*	
	BR1-2SB02	3, 6.5	native	*	*	
	BR1-2SB03	6.5	native	*	*	
	BR1-2SB04	3, 6.5	native	*	*	
	BR1-2SB05	6, 9	native	*	*	
	BR1-2SB06	6.5	native	*	*	
BR2-2	BR2-2SB01	3	native	*	*	
	BR2-2SB02	3, 6	native	*	*	
	BR2-2SB03	3	native	*	*	
BR3-1	BR3-1SB01	2, 7	native		*	
	BR3-1SB02	5, 10	native	*	*	
	BR3-1SB03	5.5, 10	native		*	
BR3-2	BR3-2SB01	9.5, 14.5, 19.5 (b)	native	*	*	
BR5-2	BR5-2SB01	2.5	native	*	*	
	BR5-2SB02	2.5	native	*	*	
	BR5-2SB03	2.5	native	*	*	
	BR5-2SB04	2, 5.5	native	*	*	
	BR5-2SB05	2.5	native	*	*	
	BR5-2SB06	2.5	native	*		
	BR5-2SB07	1.5	overburden	*	*	
	BR5-2SB08	1.5	overburden	*	*	
BR5-3	BR5-3SB01	2.5	native	*	*	
	BR5-3SB02	2.5	native	*	*	
	BR5-3SB03	2.5	native	*	*	
	BR5-3SB04	2.5	native	*	*	
BR6-1	BR6-1SB01	1.5	overburden	*	*	
	BR6-1SB02	1.5	overburden	*	*	
	BR6-1SB03	1.5	overburden	*	*	
BR6-3	BR6-3SB01	10, 15, 20 (b)	native	*		
	BR6-3SB02	2.5	native	*	*	
	BR6-3SB03	2.5	native	*		
BR7-1	BR7-1SB01	1.5	overburden		*	
	BR7-1SB02	1.5	overburden		*	
	BR7-1SB03	1.5	overburden		*	
	BR7-1SB04	1.5	overburden		*	
	BR7-1SB05	1.5	overburden		*	
	BR7-1SB06	1.5	overburden		*	
	BR7-1SB07	1.5	overburden		*	
BR7-2	BR7-2SB01	2	overburden	*	*	
	BR7-2SB02	2	overburden	*	*	
BR09-1	BR9-1SB01	5.5	native	*	*	
	BR9-1SB02	5	native	*	*	
	BR9-1SB03	4.5	native	*	*	
BR10-1	BR10-1SB01	2	overburden (LTTD)	*	*	*
	BR10-1SB02	3	native	*		
	BR10-1SB03	3	native	*		
	BR10-1SB04	2	overburden (LTTD)	*	*	*
	BR10-1SB05	2	overburden (LTTD)	*	*	*
	BR10-1SB06	2	overburden (LTTD)	*	*	*
	BR10-1SB07	2	overburden (LTTD)	*	*	*
BR10-2	BR10-2SB01	3	native	*		
BR10-3	BR10-3SB01	2.5	overburden (LTTD)	*	*	*
	BR10-3SB02	1.5	overburden	*	*	

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FDS Section	Sample Location	Sample Depth (ft bgs)	Soil Type to Sample (a)	Laboratory Analyses		
				TPHfo/TPHd (EPA 8015m)	PAHs (EPA 8270C)	BTEX (EPA 8021)
BR12-1	BR12-1SB01	2	native	*		
	BR12-1SB02	2	native	*		
	BR12-1SB03	5.5	native	*		
BR13-1	BR13-1SB01	2	overburden	*	*	
	BR13-1SB02	2	overburden	*	*	
	BR13-1SB03	5	native	*		
MT-2	MT-2SB01	2	native		*	
	MT-2SB02	2.5, 5	native	*	*	
	MT-2SB03	2.5, 5	native	*	*	
	MT-2SB04	2.5, 5	native	*	*	
	MT-2SB05	2.5, 5	native	*	*	
	MT-2SB06	2.5, 5	native	*	*	
MT-3	MT-3SB01	4	overburden	*	*	
	MT-3SB02	2.5	overburden	*	*	
	MT-3SB03	2	overburden	*	*	
	MT-3SB04	2	overburden	*	*	
	MT-3SB05	4	native		*	
	MT-3SB06	12.5, 17.5, 22.5 (b)	native	*	*	
	MT-3SB07	2	overburden	*	*	
	MT-3SB08	2	overburden	*	*	
	MT-3SB09	2	overburden	*	*	
MT-4	MT-4SB01	2	overburden	*		
	MT-4SB02	2	overburden	*		
	MT-4SB03	2	overburden	*		
	MT-4SB04	2	overburden	*		
	MT-4SB05	2	overburden	*		
	MT-4SB06	2	overburden	*		
MT-5	MT-5SB01	4.5	native		*	
	MT-5SB02	6-8	native	*	*	
MT-9	MT-9SB01	2	overburden	*	*	
	MT-9SB02	2	overburden	*	*	
	MT-9SB03	2	overburden	*	*	
MT-10	MT-10SB01	0.5	native	*	*	
MT-11	MT-11SB01	2	overburden		*	
	MT-11SB02	2	overburden		*	
	MT-11SB03	2	overburden		*	
	MT-11SB04	2	overburden		*	
	MT-11SB05	2	overburden		*	
	MT-11SB06	2	overburden		*	
	MT-11SB07	2	overburden		*	
	MT-11SB08	2	overburden		*	
MT-12	MT-12SB01	2	overburden		*	
	MT-12SB02	2	overburden		*	
	MT-12SB03	2	overburden		*	
	MT-12SB04	2	overburden		*	
MT-13	MT-13SB01	2	overburden	*	*	
	MT-13SB02	2	overburden	*	*	

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Soil Sample Laboratory Analysis Matrix
for Data Gap Analysis of Fuel Distribution System Sections
Presidio of San Francisco, California

FDS Section	Sample Location	Sample Depth (ft bgs)	Soil Type to Sample (a)	Laboratory Analyses		
				TPHfo/TPHd (EPA 8015m)	PAHs (EPA 8270C)	BTEX (EPA 8021)
MT-15	MT-15SB01	2.5	native	*	*	
	MT-15SB02	3.5	native	*	*	
	MT-15SB03	3.5	native	*	*	
MT-16	MT-16SB01	1.5	overburden	*	*	
	MT-16SB02	1.5	overburden	*	*	
	MT-16SB03	1.5	overburden	*	*	
MT-17	MT-17SB01	2	overburden	*		
	MT-17SB02	2	overburden	*		
	MT-17SB03	2.5	native	*	*	
	MT-17SB04	1.5	overburden	*		
	MT-17SB05	2	overburden	*		
	MT-17SB06	2	overburden	*		
	MT-17SB07	2	overburden	*		
	MT-17SB08	2	overburden	*		
	MT-17SB09	2	overburden	*		
	MT-17SB10	2	overburden	*		

Abbreviations:
BTEX – benzene, toluene, ethylbenzene, xylenes
ft bgs – feet below ground surface
LTTD – low-temperature thermal desorption
PAHs – polycyclic aromatic hydrocarbons
TPH-fo – total petroleum hydrocarbons as fuel oil
TPH-mo – total petroleum hydrocarbons as motor oil

Notes:
(a) For purposes of this investigation "overburden" refers to the soil that was excavated by the Army as part of the FDS removal and used as backfill. "Native" soil is soil that was not excavated by the Army as part of the FDS removal and remediation activities. "Overburden (LTTD)" indicates LTTD-treated soil that was used to backfill FDS removal and remediation areas and sample should be collected from the LTTD-treated soil.
(b) Chemical concentration profile is to be conducted in order to asses the vertical extent of affected soil at these sample locations. The shallowest sample depth corresponds to the depth of the original Army sample where TPH concentrations were elevated and may have exceeded cleanup levels. The second sample should be collected five feet below the visually affected soil or the first sample, whichever is greater. The third sample should be collected five feet below the second sample. Additonally, a groundwater sample will be collected if groundwater is encountered during soil profiling activities and analyzed for TPH and PAHs, as applicable.

Legend:

- Water Body
- 610 — Building and Number
- Pavement
- Presidio Base Boundary
- Fuel Distribution System
- Removed Fuel Distribution System
- Abandoned Fuel Distribution System
- Previously Removed Fuel Distribution System

Notes: Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet

Vertical Datum: Presidio Lower Low Water (ft. LLW)

FDS Closure Group I

FDS Sections included in 2006 Field Sampling Plan

(1) FSP Figure No.

Area 6 Section B

Area 6 Section A

Area 5 Section D

Area 5 Section C

Area 5 Section B

Area 5 Section A

San Francisco Bay

Pacific Ocean

Golden Gate Bridge

Mountain Lake

Lobos Creek

Howard Rd.

Lincoln Blvd.

Kobbe Ave.

Crissy Field Ave

Hwy. 101

Old Mason St.

Lincoln Blvd.

Schofield Rd.

McDowell

Washington Blvd.

Tunnel

Gen. Douglas MacArthur

Park Blvd.

Park - Presidio Blvd.

Arguello Blvd.

Simonds Rd.

Upton Blvd.

MT-1 (12) BR9-1 CF-7 CF-6 CF-11 CF-10 CF-9 CF-8

MT-2 (18) CF-1 CF-2 CF-12 CF-4 CF-3

MT-3 (19) BR1-2 (2) BR1-1 (1) BR2-3 BR14-1 BR3-5 BR3-4 BR11-1 BR6-5 BR7-1 (10) BR7-2 (11) BR10-1 (13) BR10-3 (15) BR8-1 BR16-1

MT-4 (20) BR3-1 (4) BR2-2 BR2-1 (3) BR5-2 (6) BR3-2 (5) BR3-3 BR5-3 (7) BR6-4 MT-17 (30) BR6-3 (9) MT-16 (29) BR10-2 (14) BR12-1 (16) BR13-1 (17)

MT-5 (21) MT-6 BR4-1 MT-10 (23) MT-11 (24) MT-12 (25) BR6-2 BR6-1 (8) MT-15 (28) MT-14 (27) BR13-2

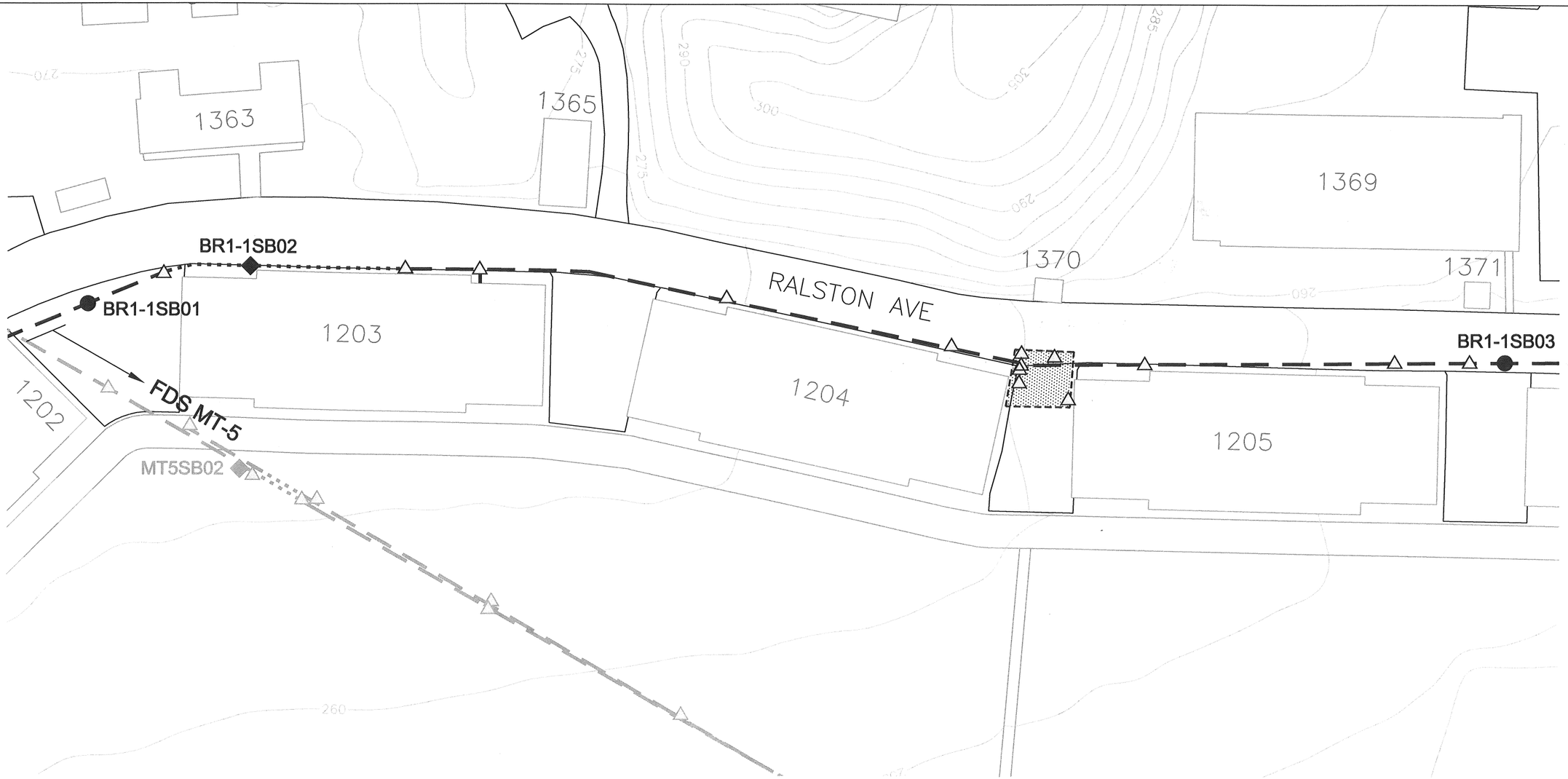
MT-7 MT-8 MT-9 (22) MT-13 (26) BR15-1

0 225 450 feet

MONTGOMERY WATSON

PRESIDIO OF SAN FRANCISCO CALIFORNIA

FDS PIPELINE REMOVAL
INDEX MAP



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ● Proposed Overburden Soil Sampling Location
- ------ FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▨ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

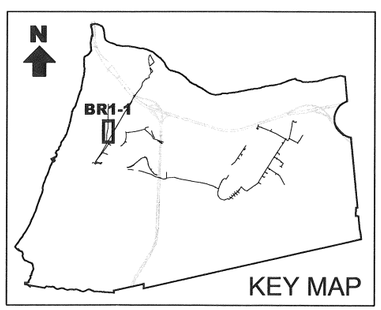
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

(Approximate Scale in Feet)

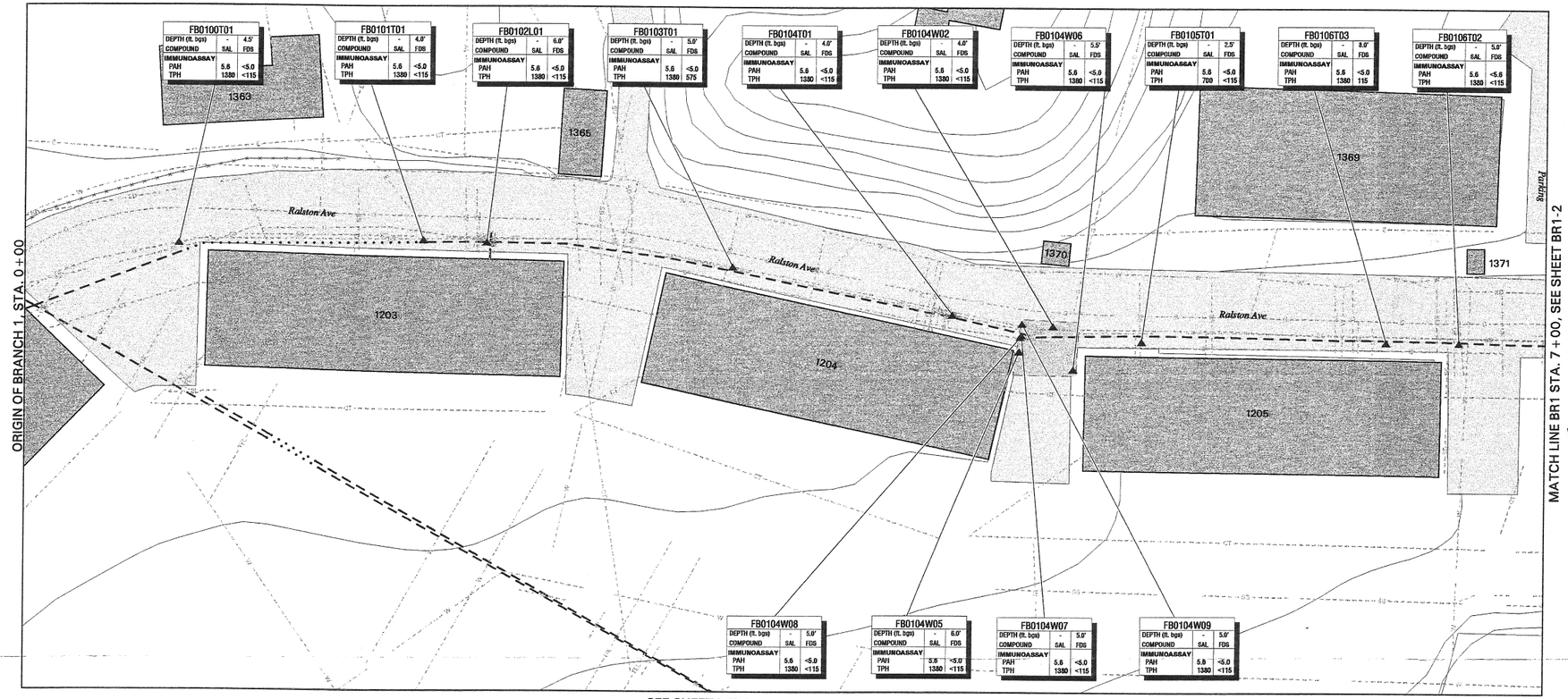


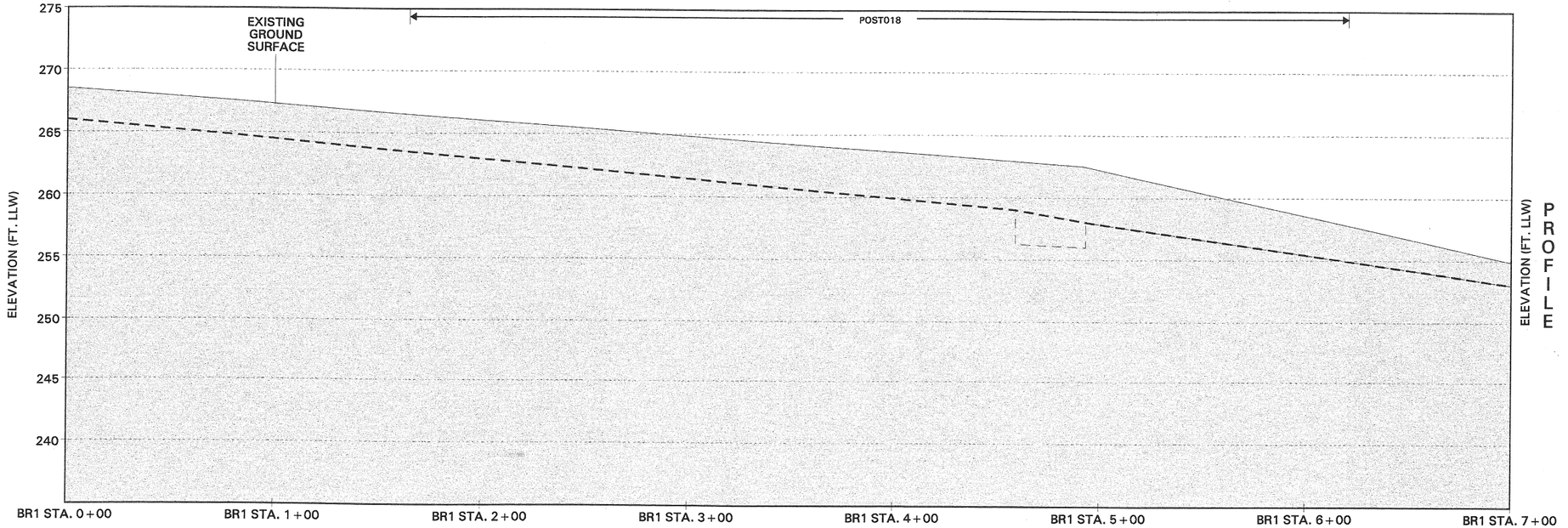
KEY MAP

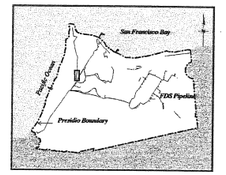
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR1-1

April 2007
EKI A70004.16
Figure 1







FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line (Letter Designates Utility Type A Designates Abandoned
	Pavement
1363	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned in Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	POST018
Total Petroleum Hydrocarbons (mg/kg)	21
BETX (mg/kg)	
Benzene	<0.005
Ethylbenzene	<0.005
Toluene	<0.005
Xylenes (total)	<0.005
Total Carcinogenic PAHs (mg/kg)	NA
Immunoassay-PAHs (mg/kg)	<5.6
SPLP (µg/l)	
Diesel Range	70
Gasoline Range	<50
Benzene	<0.5
Ethylbenzene	<0.5
Toluene	<0.5
Xylenes (m&p-)	<0.5
Xylenes (o-)	<0.5

REVISION	DATE	DESCRIPTION	BY	CK
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

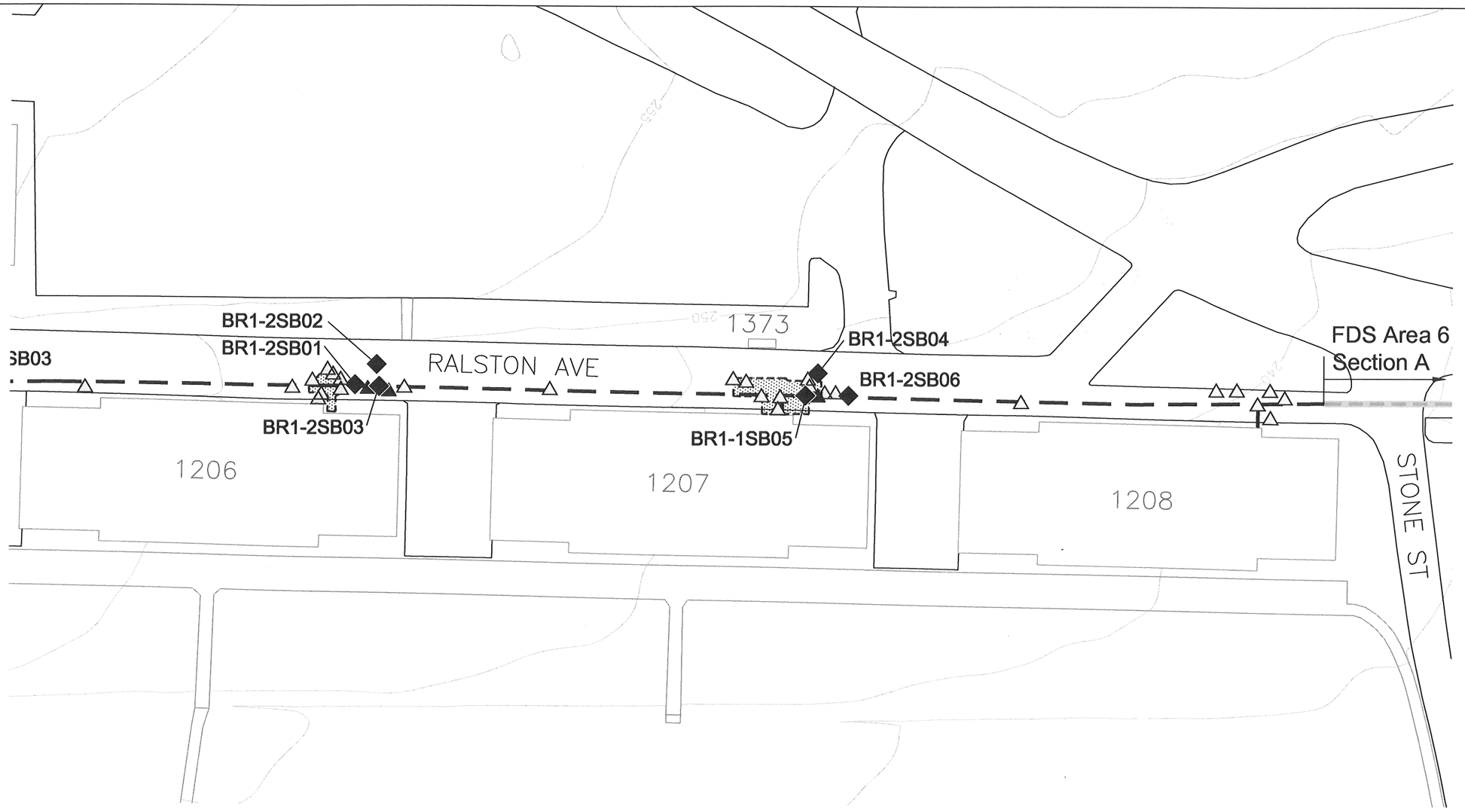
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN:
CHECKED: I. KENNEDY
SUBMITTED:
DATE APPROVED:

PRESIDIO OF SAN FRANCISCO, CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR1 STATION 0+00 TO 7+00

SCALE:
SPEC. No.
SHEET BR1-1
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

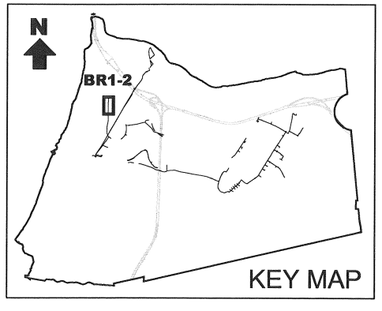
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

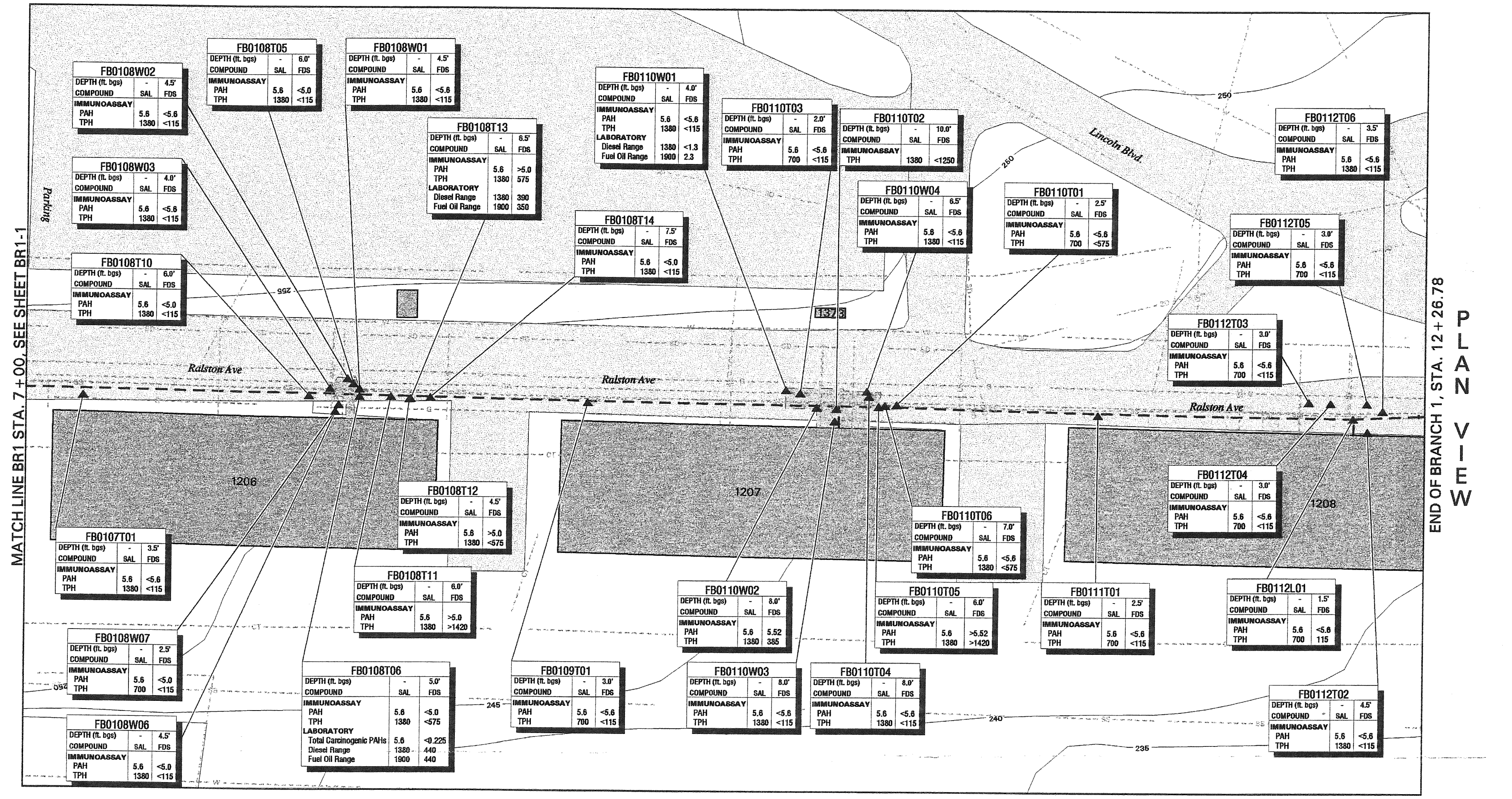
(Approximate Scale in Feet)

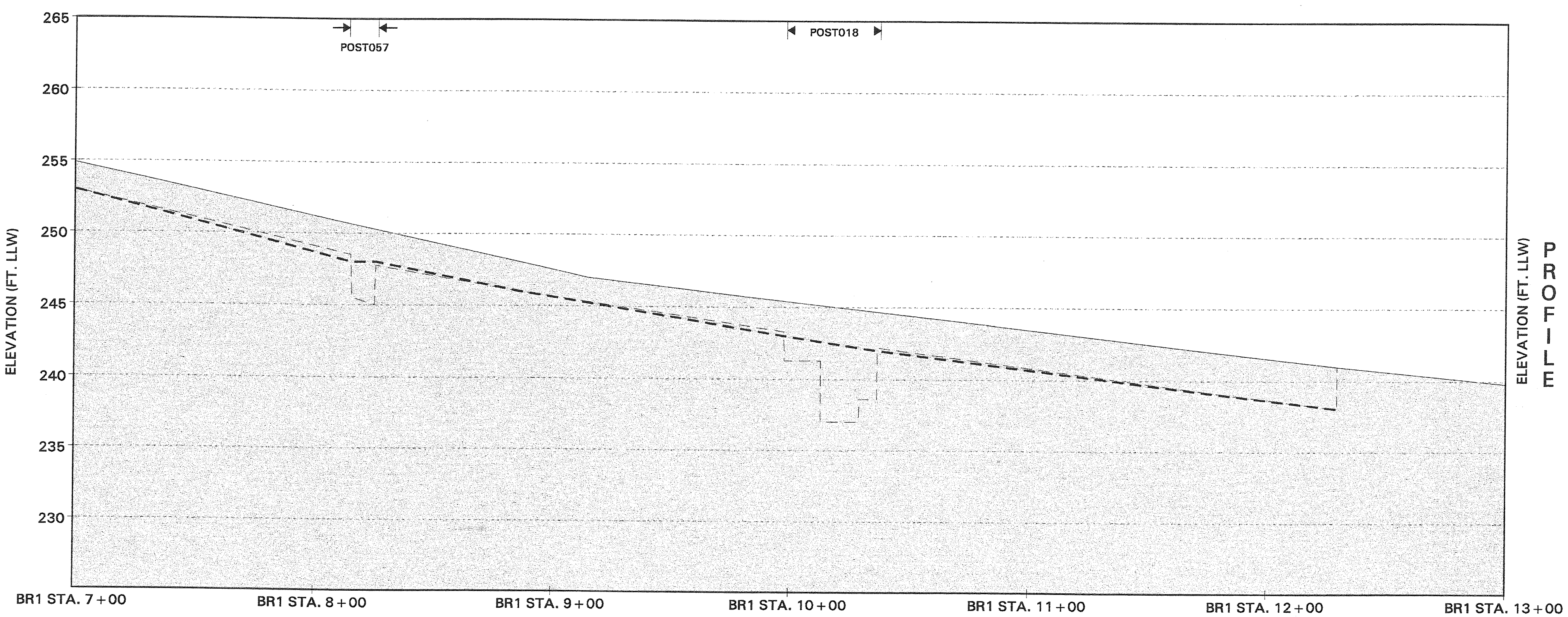


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR1-2

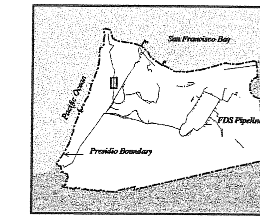
April 2007
EKI A70004.16
Figure 2





HORIZONTAL SCALE: 1" = 30'

VERTICAL SCALE: 1" = 5'



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30 feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST018	POST057
Total Petroleum Hydrocarbons (mg/kg)	21	40
BETX (mg/kg)		
Benzene	<0.005	<0.005
Ethylbenzne	<0.005	<0.005
Toluene	<0.005	<0.005
Xylenes (total)	<0.005	<0.005
Total Carcinogenic PAHs (mg/kg)	NA	NA
Immunoassay-PAHs (mg/kg)	<5.6	<5.6
SPLP (µg/l)		
Diesel Range	70	NA
Gasoline Range	<50	NA
Benzene	<0.5	NA
Ethylbenzene	<0.5	NA
Toluene	<0.5	NA
Xylenes (m&p-)	<0.5	NA
Xylenes (o-)	<0.5	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF

DRAWN: I. KENNEDY

CHECKED:

PRESIDIO OF SAN FRANCISCO CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT BR1 STATION 7+00 TO 12+26.78

SUBMITTED:

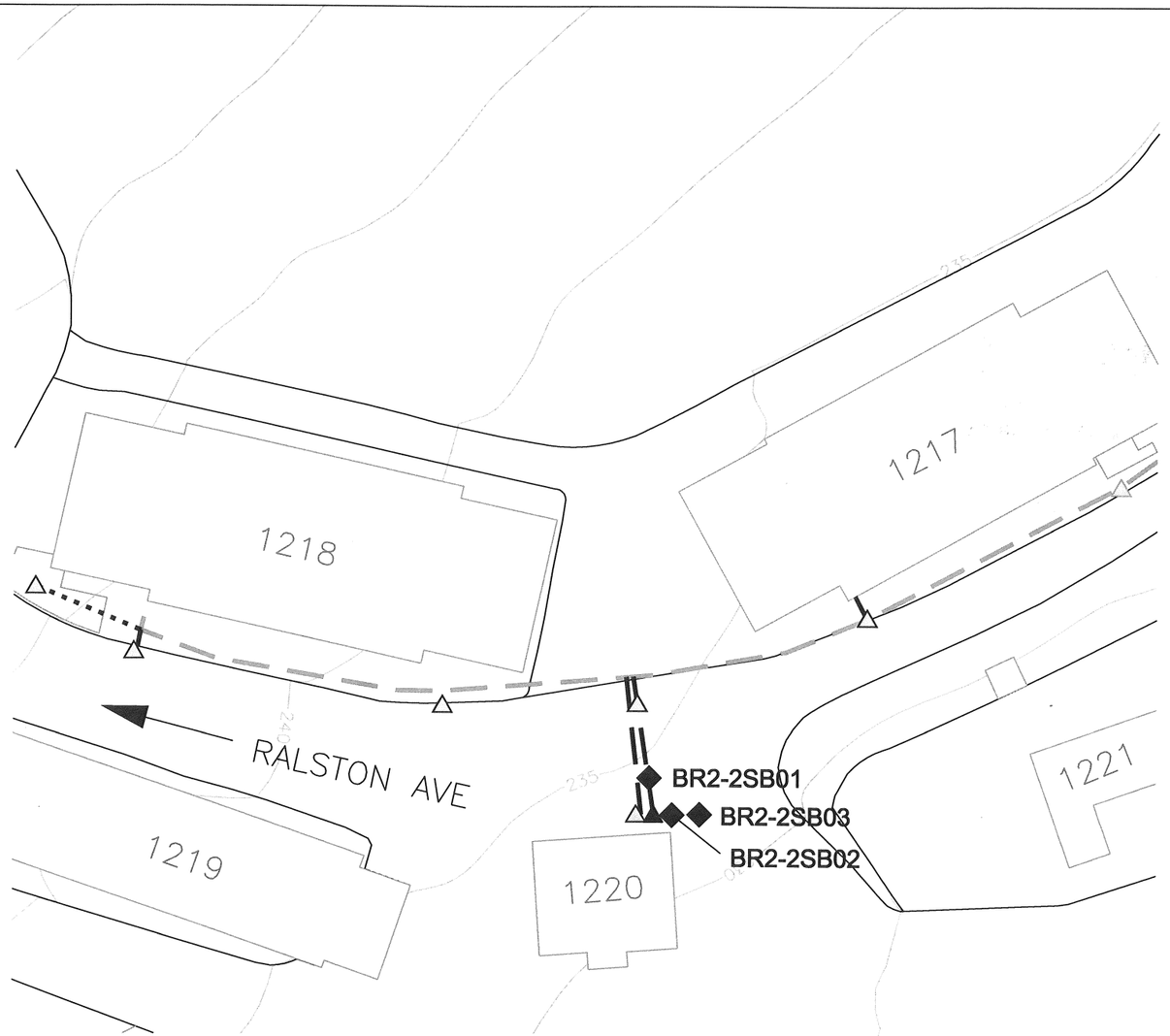
DATE APPROVED:

SCALE:

SPEC. No.

SHEET BR1-2

FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ------- FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)

Abbreviation:

FDS Fuel Distribution System

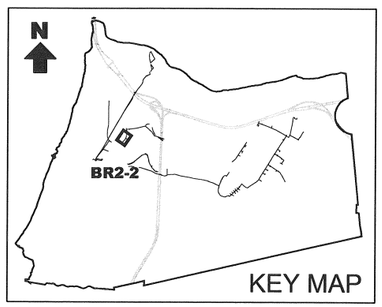
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

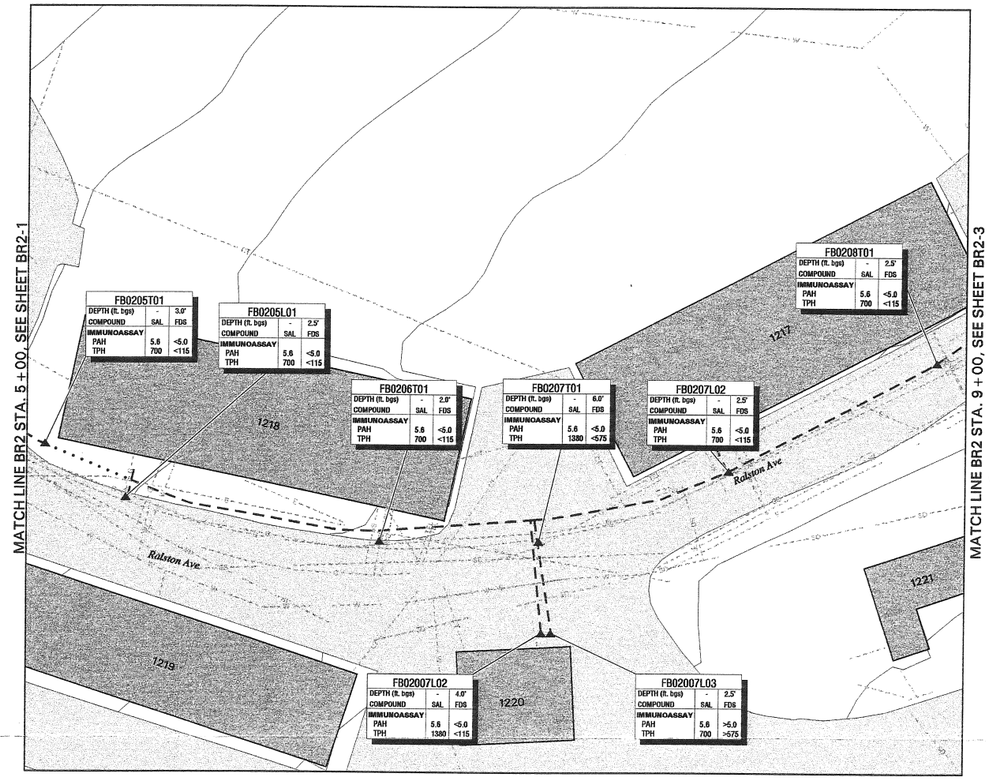
(Approximate Scale in Feet)

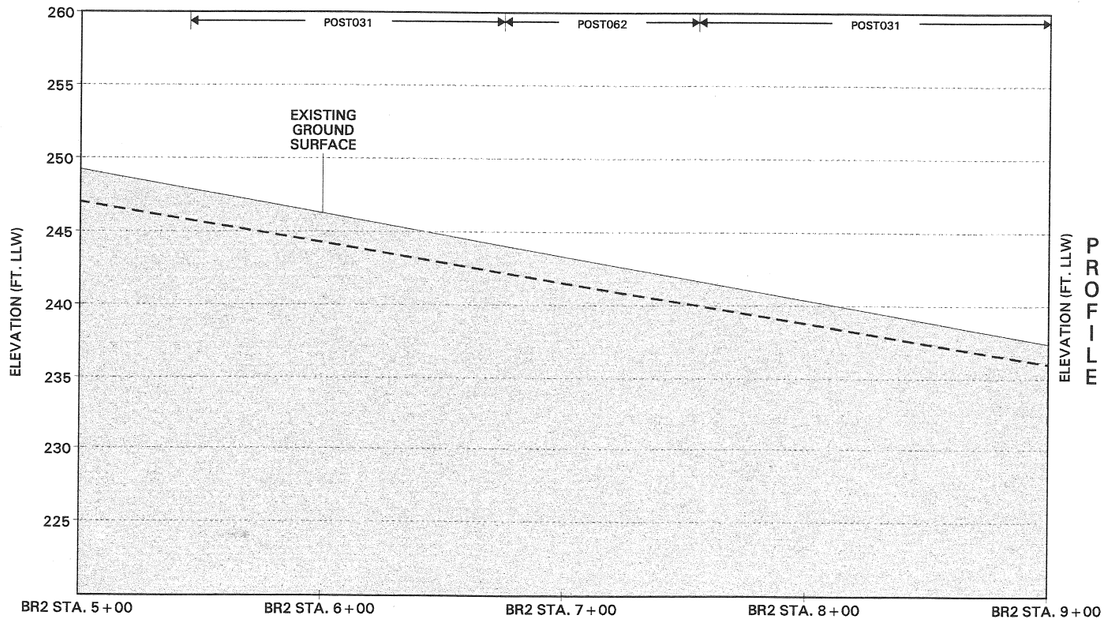


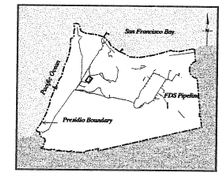
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR2-2

April 2007
EKI A70004.16
Figure 3







FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
1218	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1998)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST031	POST062
Total Petroleum Hydrocarbons (mg/kg)	21	4
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzene	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	<0.17	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6
SPLP (µg/l)		
Diesel Range	<50	NA
Gasoline Range	<50	NA
Benzene	<0.5	NA
Ethylbenzene	<0.5	NA
Toluene	<0.5	NA
Xylenes (m&p-)	<0.5	NA
Xylenes (o-)	1.7	NA

REVISION	DATE	DESCRIPTION	BY	AP
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

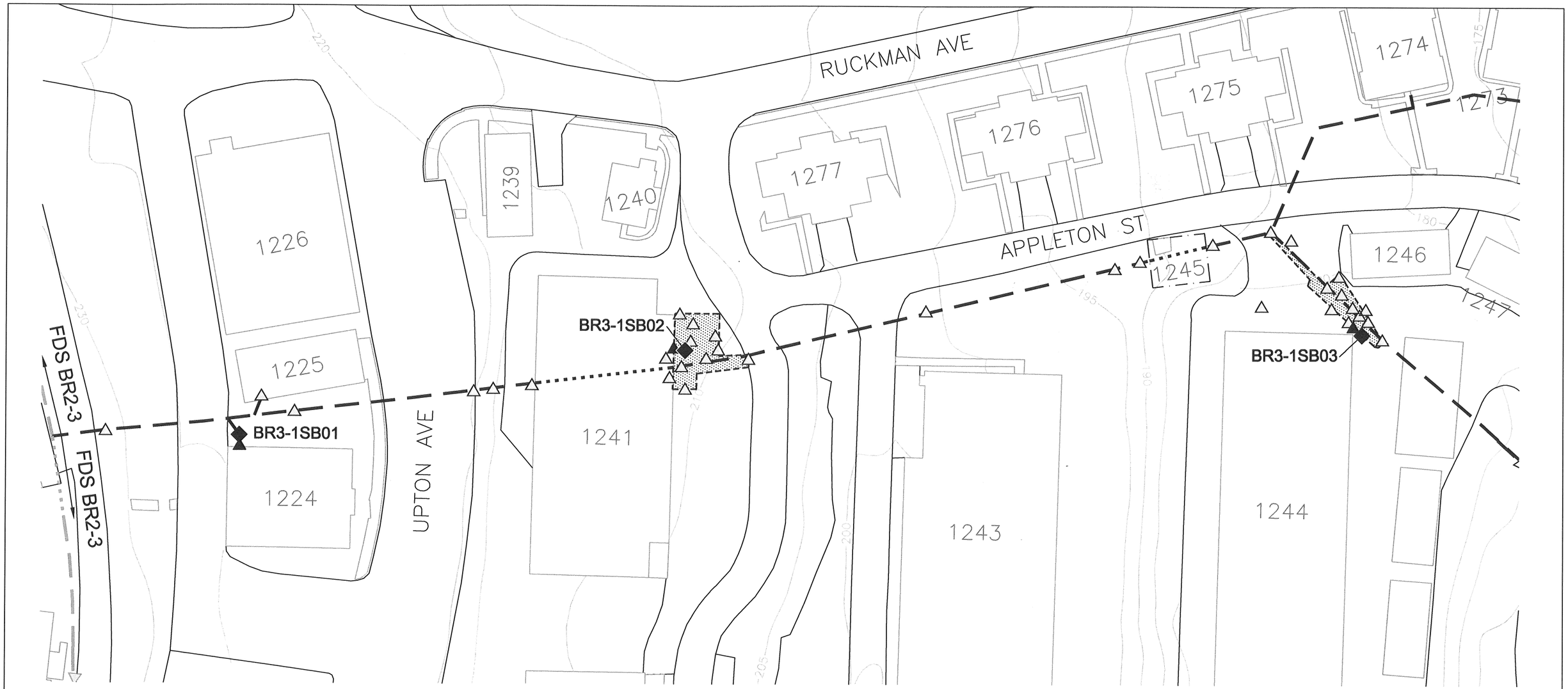
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERING
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:
SUBMITTED:
DATE APPROVED:

PRESIDIO OF SAN FRANCISCO CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT BR2 STATION 5+00 TO 9+00

SCALE:
SHEET BR2-2
SPEC. No.
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area
- Former Building

Abbreviation:

FDS Fuel Distribution System

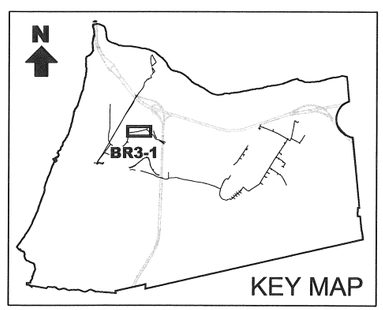
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

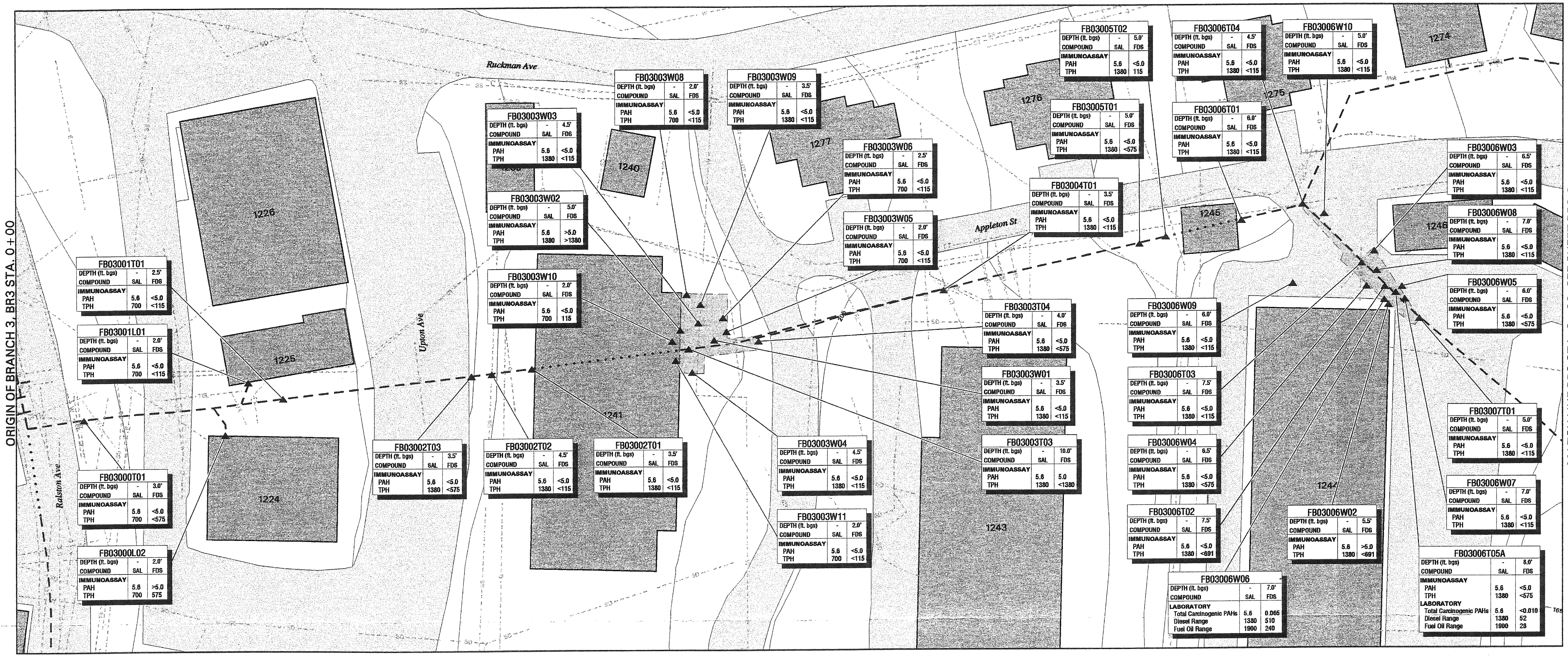
(Approximate Scale in Feet)



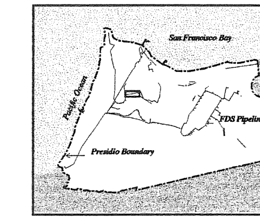
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR3-1

April 2007
EKI A70004.16
Figure 4



SEE SHEET BR2-3



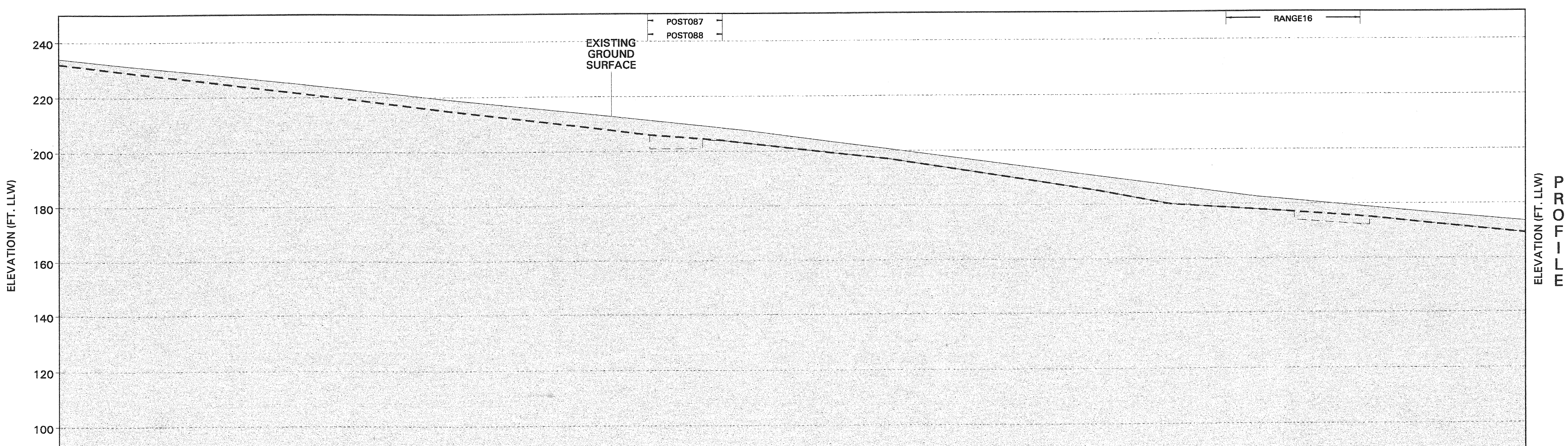
FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 20'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.

0 15 30 feet

LTTD Soil Sample Analytical Results

Analyte (unit of measure)	POST087	POST088	RANGE16
Total Petroleum Hydrocarbons (mg/kg)	38	15	13 - 61
BETX (mg/kg)			
Benzene	<0.006	<0.006	<0.006
Ethylbenzne	<0.006	<0.006	<0.006
Toluene	<0.006	<0.006	<0.006
Xylenes (total)	<0.006	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	NA	NA	NA
Immunoassay-PAHs (mg/kg)	<5.6	<5.6	<5.6
SPLP (μg/l)			
Diesel Range	NA	NA	NA
Gasoline Range	NA	NA	NA
Benzene	NA	NA	NA
Ethylbenzene	NA	NA	NA
Toluene	NA	NA	NA
Xylenes (m&p-)	NA	NA	NA
Xylenes (o-)	NA	NA	NA

RANGE 16 = Postpiles 081, 083, 085, 087

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

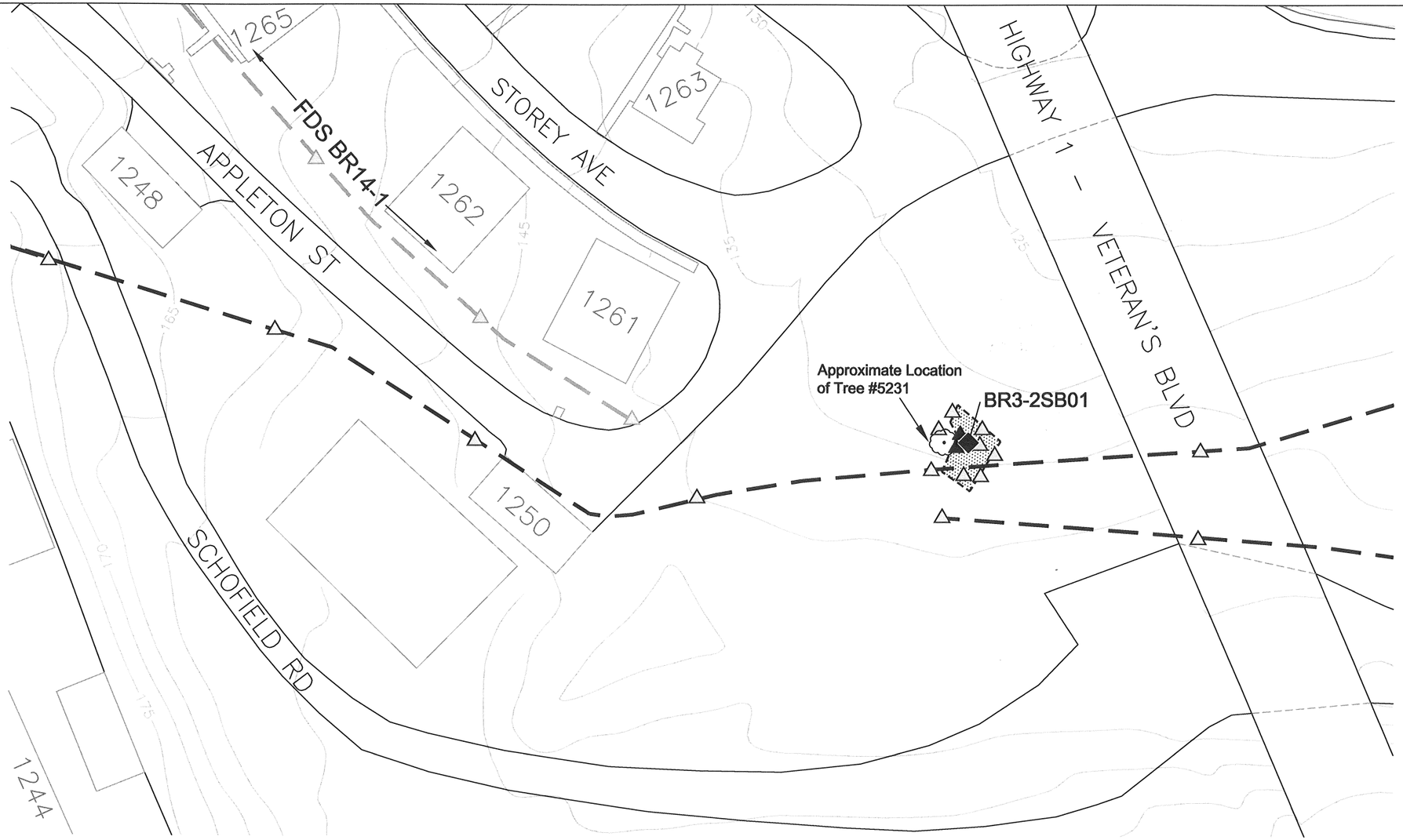
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT BR3 STATION 0+00 TO 8+00

SUBMITTED: DATE APPROVED:
SCALE: SPEC. No.
SHEET BR3-1 FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

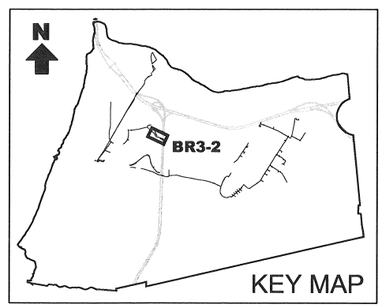
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

(Approximate Scale in Feet)



Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR3-2

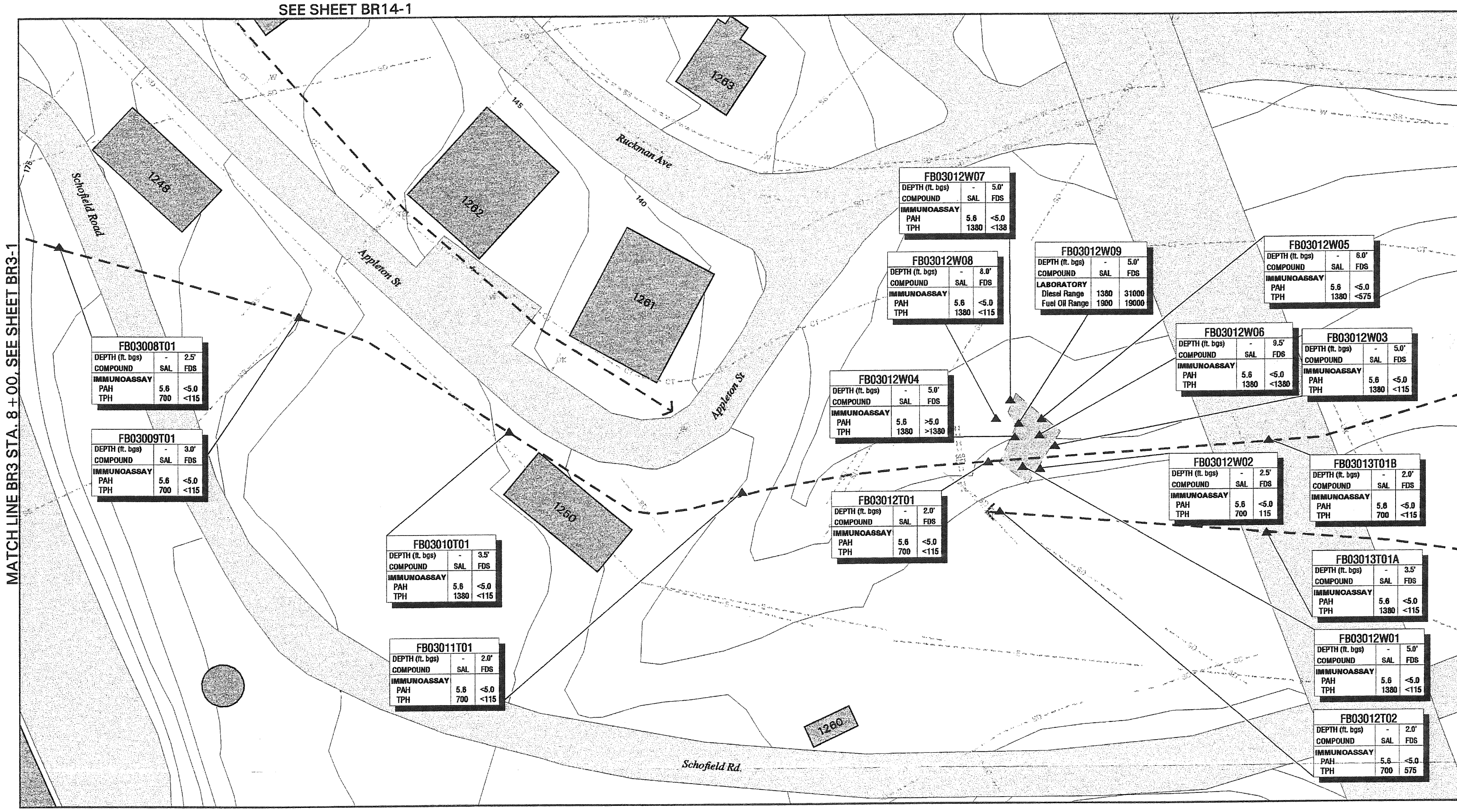
April 2007
EKI A70004.16
Figure 5

SEE SHEET BR14-1

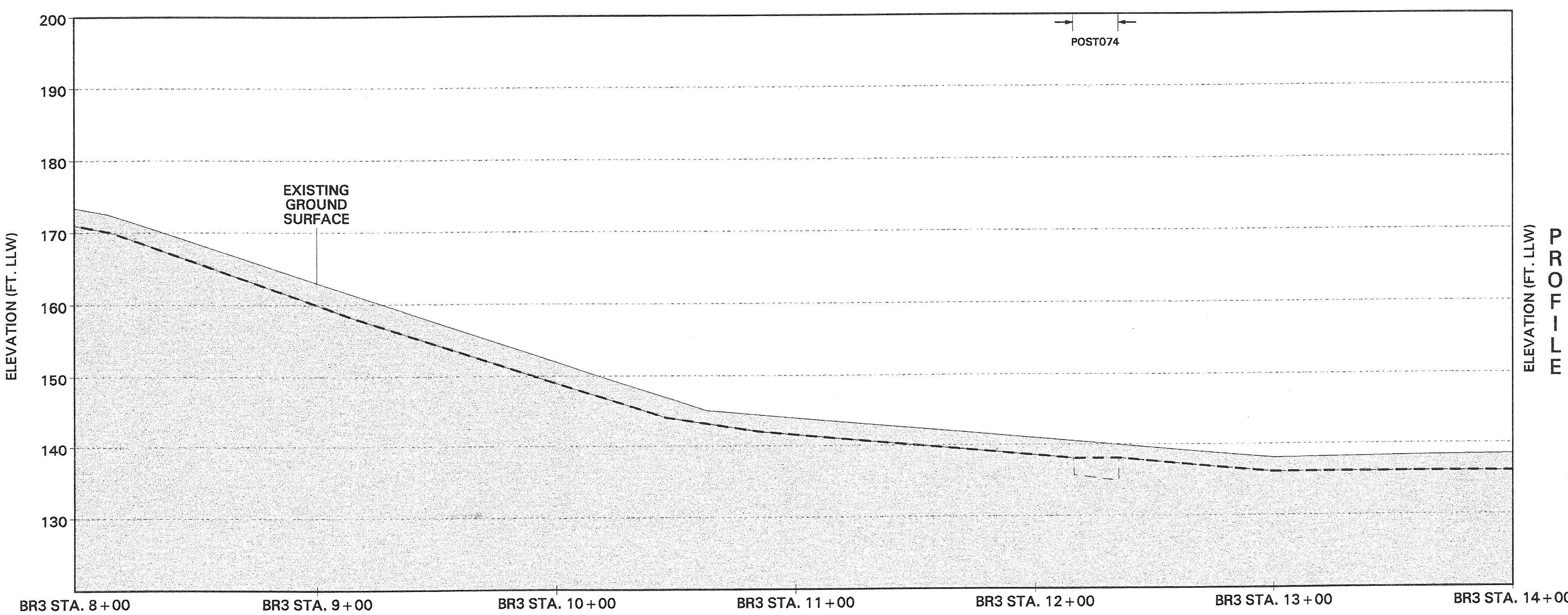
MATCH LINE BR3 STA. 8+00, SEE SHEET BR3-1

MATCH LINE BR3 STA. 14+00, SEE SHEET BR3-3

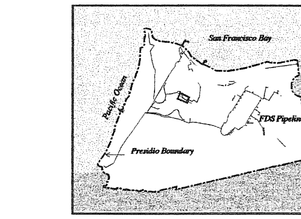
PLAN VIEW



PROFILE



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	POST074
Total Petroleum Hydrocarbons (mg/kg)	83
BETX (mg/kg)	
Benzene	<0.006
Ethylbenzne	<0.006
Toluene	<0.006
Xylenes (total)	<0.006
Total Carcinogenic PAHs (mg/kg)	0.163
Immunoassay-PAHs (mg/kg)	RS
SPLP (µg/l)	
Diesel Range	NA
Gasoline Range	NA
Benzene	NA
Ethylbenzene	NA
Toluene	NA
Xylenes (m&p-)	NA
Xylenes (o-)	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR3 STATION 8+00 TO 14+00

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.
SHEET BR3-2 FILE No.

Sample ID	TPHd	TPHfo
1326FDSEX105[3]	560 (4)	410 (6)
DUP101403A	1,300 (4)	1,100 (6)

Sample ID	TPHd	TPHfo
1326FDSEX101[2]	**8,000 (4)(5)**	**6,600 (6)**

Sample ID	TPHd	TPHfo
1326FDSEX104[3]	91 (4)	56 (6)

Sample ID	TPHd	TPHfo
1326FDSEX102[2]	230 (4)(5)(6)	370 (6)

Sample ID	TPHd	TPHfo
1326FDSEX103[3]	950 (4)	750 (6)

KOBBE AVE

1330

1328

1326

1324

1322

1320

1321

1319

1317

1315

1323

1327

1325

1313

HITCHCOCK ST

WISSER CT

WRIGHT LOOP

FDS MT-8

BR5-2SB05

BR5-2SB02

BR5-2SB04

BR5-2SB01

BR5-2SB03

BR5-2SB06

BR5-2SB07

BR5-2SB08

Utility Trench
(see Note 3)

Legend:

- Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- Proposed Native Soil Sampling Location
- Proposed Overburden Soil Sampling Location
- T&R Soil Sampling Location (2004)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- High Pressure Natural Gas Pipeline
- Historic Excavation Area

Abbreviation:

FDS	Fuel Distribution System
TPH	Total Petroleum Hydrocarbons
TPHd	Total Petroleum Hydrocarbons as Diesel
TPHfo	Total Petroleum Hydrocarbons as Fuel Oil

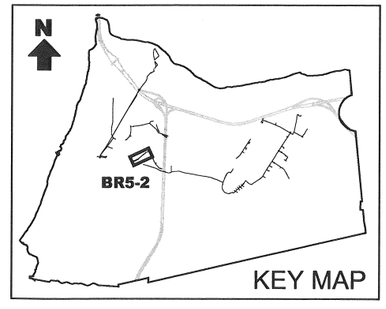
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.
3. Approximate area of utility trench excavation where visually affected soil remaining in place was observed along the northern trench wall, in bedding sand beneath the high pressure natural gas pipeline.
4. Heavier hydrocarbons contributed to TPH quantitation.
5. Sample exhibits a fuel pattern which does not resemble standard.
6. Lighter hydrocarbons contributed to TPH quantitation.
7. Reported chemical concentrations above soil cleanup levels are in **bold**.

0 50 100

(Approximate Scale in Feet)

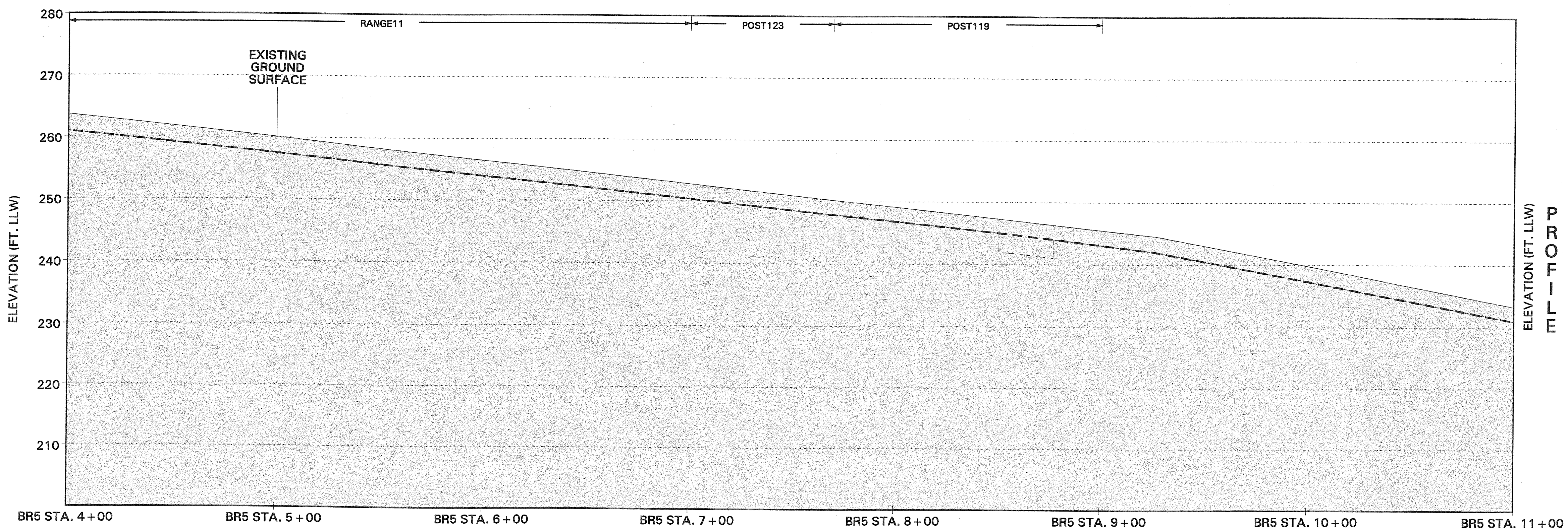
N



Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR5-2

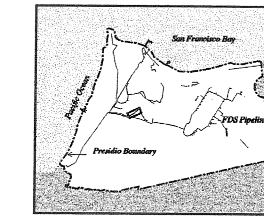
April 2007
EKI A70004.16
Figure 6



HORIZONTAL SCALE: 1" = 30'

VERTICAL SCALE: 1" = 10'

PROFILE DOES NOT SHOW PREVIOUSLY ABANDONED PIPELINE.



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results			
Analyte (unit of measure)	POST119	POST123	RANGE11
Total Petroleum Hydrocarbons (mg/kg)	25.3	15	15 - 52
BETX (mg/kg)			
Benzene	<0.006	<0.006	<0.006
Ethylbenzne	<0.006	<0.006	<0.006
Toluene	<0.006	<0.006	<0.006
Xylenes (total)	<0.006	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	NA	0.297	0.297 - 1.81
Immunoassay-PAHs (mg/kg)	<5.6	RS	<5.6
SPLP (μg/l)			
Diesel Range	NA	<50	<50
Gasoline Range	NA	<50	<50
Benzene	NA	<0.5	<0.5
Ethylbenzene	NA	<0.5	<0.5
Toluene	NA	<0.5	<0.5
Xylenes (m&p-)	NA	<0.5	<0.5
Xylenes (o-)	NA	<0.5	<0.5

RANGE 11 = Postpiles 088, 123, 146

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF

DRAWN: I. KENNEDY

CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR5 STATION 4+00 TO 11+00

SUBMITTED:

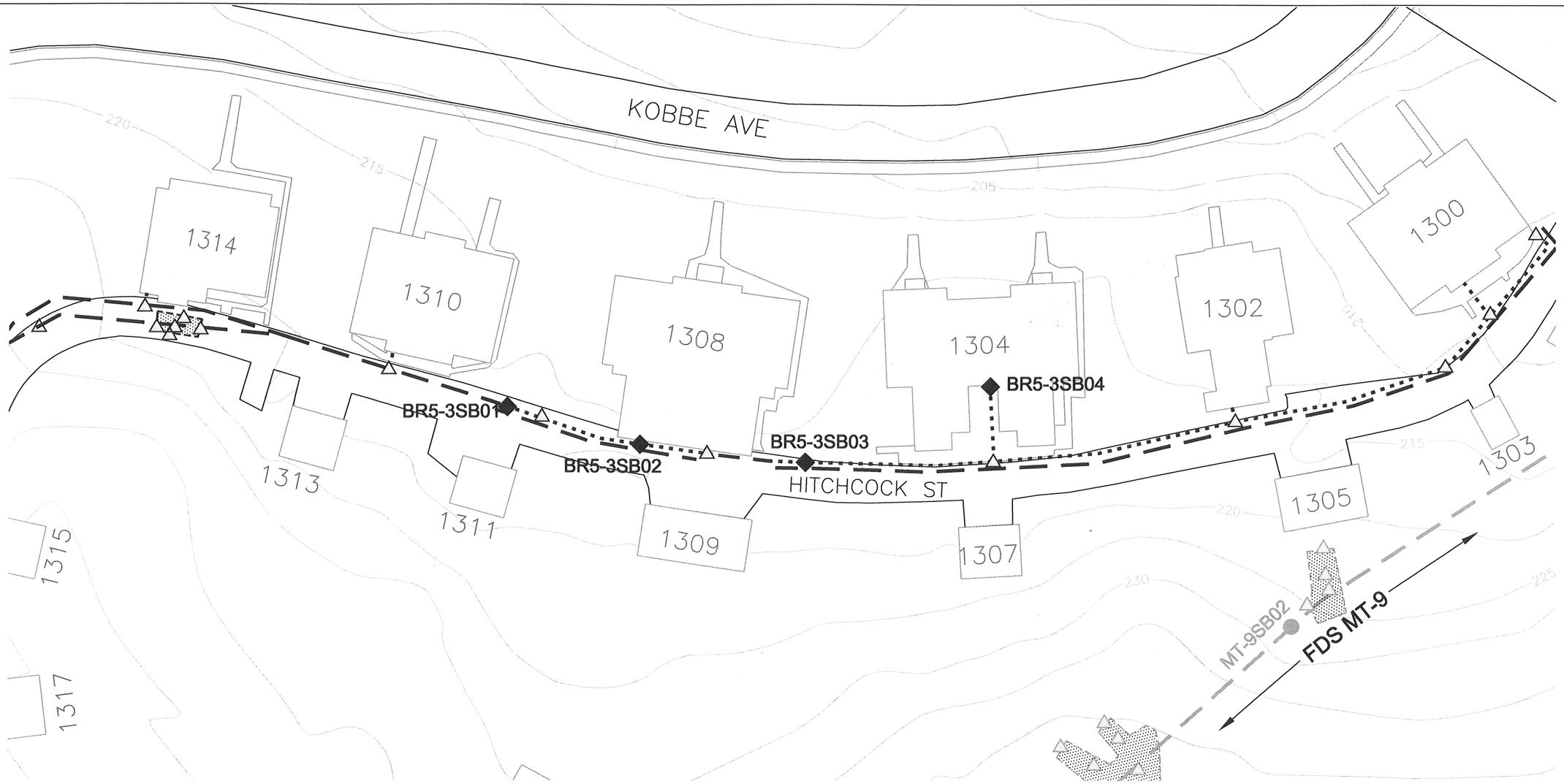
DATE APPROVED:

SCALE:

SPEC. No.

SHEET BR5-2

FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ● Proposed Overburden Soil Sampling Location
- ▪▪▪▪▪▪▪ FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▒ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

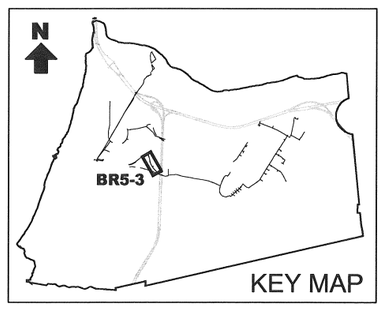
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

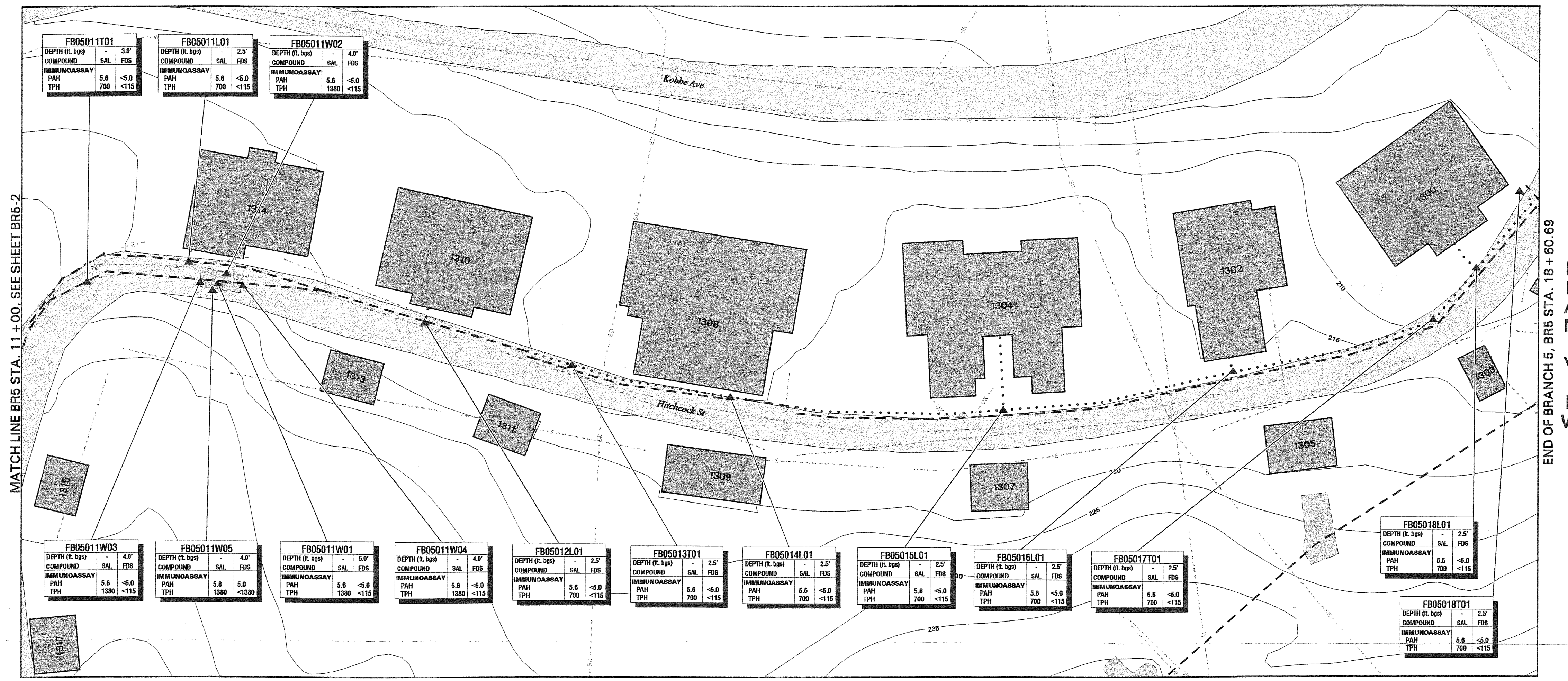
(Approximate Scale in Feet)

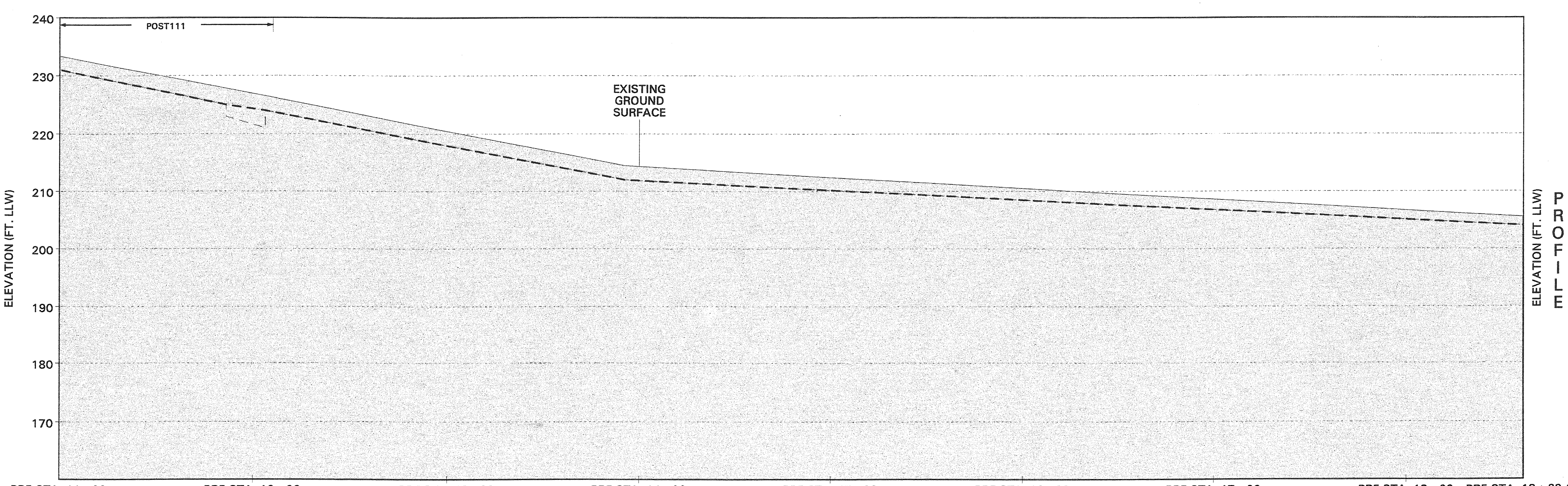


Erler & Kalinowski, Inc.

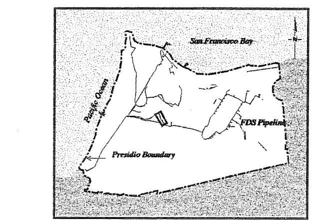
Proposed Sampling Locations
at Fuel Distribution System
Section BR5-3

April 2007
EKI A70004.16
Figure 7





HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	POST111
Total Petroleum Hydrocarbons (mg/kg)	32
BETX (mg/kg)	
Benzene	<0.006
Ethylbenzne	<0.006
Toluene	<0.006
Xylenes (total)	<0.006
Total Carcinogenic PAHs (mg/kg)	NA
Immunoassay-PAHs (mg/kg)	<5.6
SPLP (µg/l)	
Diesel Range	NA
Gasoline Range	NA
Benzene	NA
Ethylbenzene	NA
Toluene	NA
Xylenes (m&p-)	NA
Xylenes (o-)	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

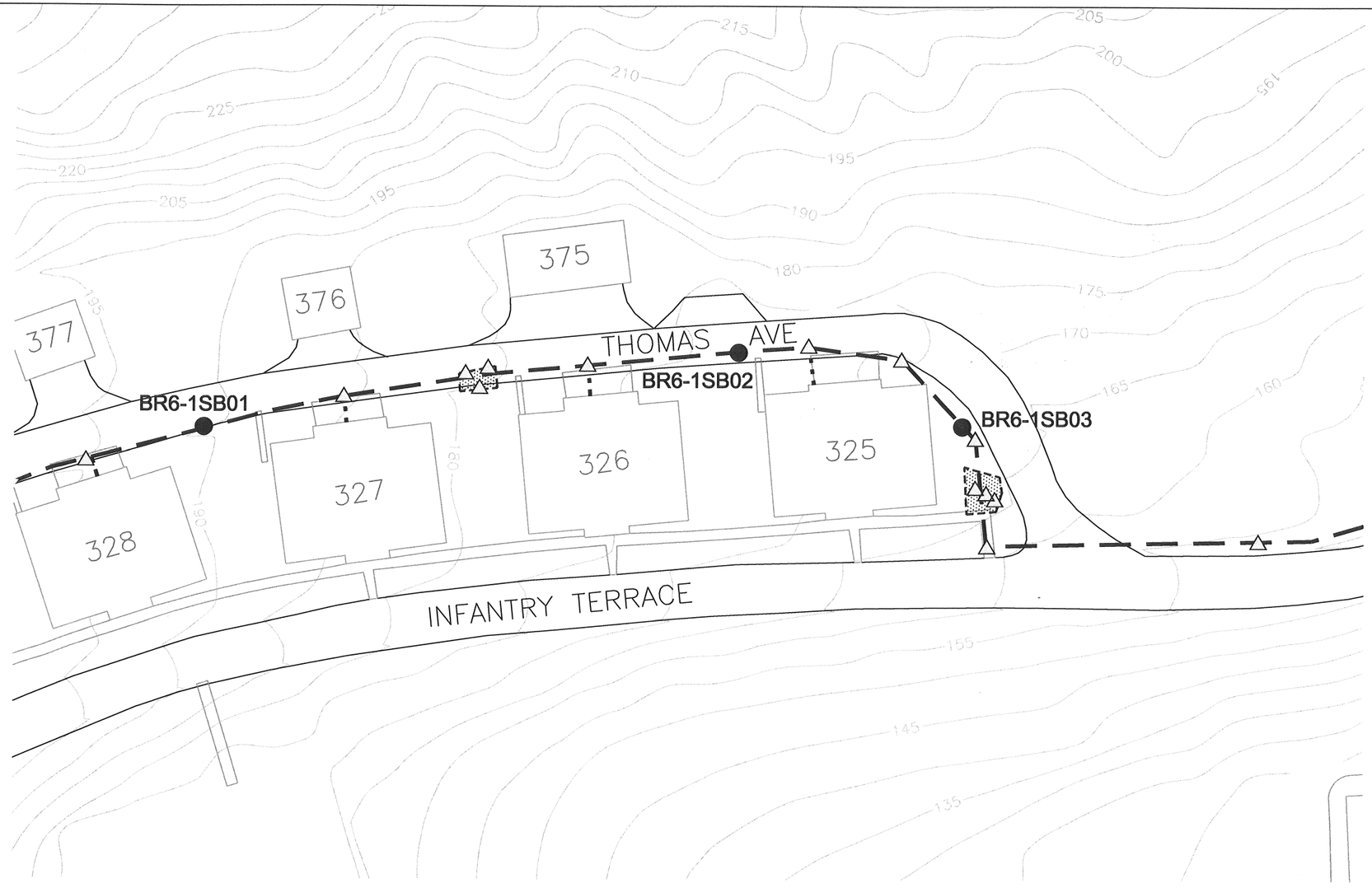
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR5 STATION 11+00 TO 18+60.69

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.
SHEET BR5-3 FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area

Abbreviation:

FDS	Fuel Distribution System

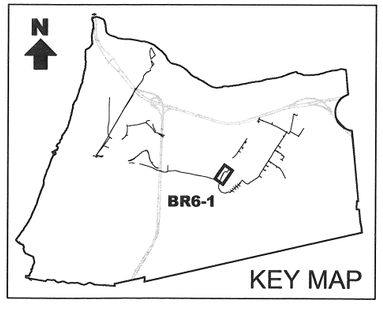
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

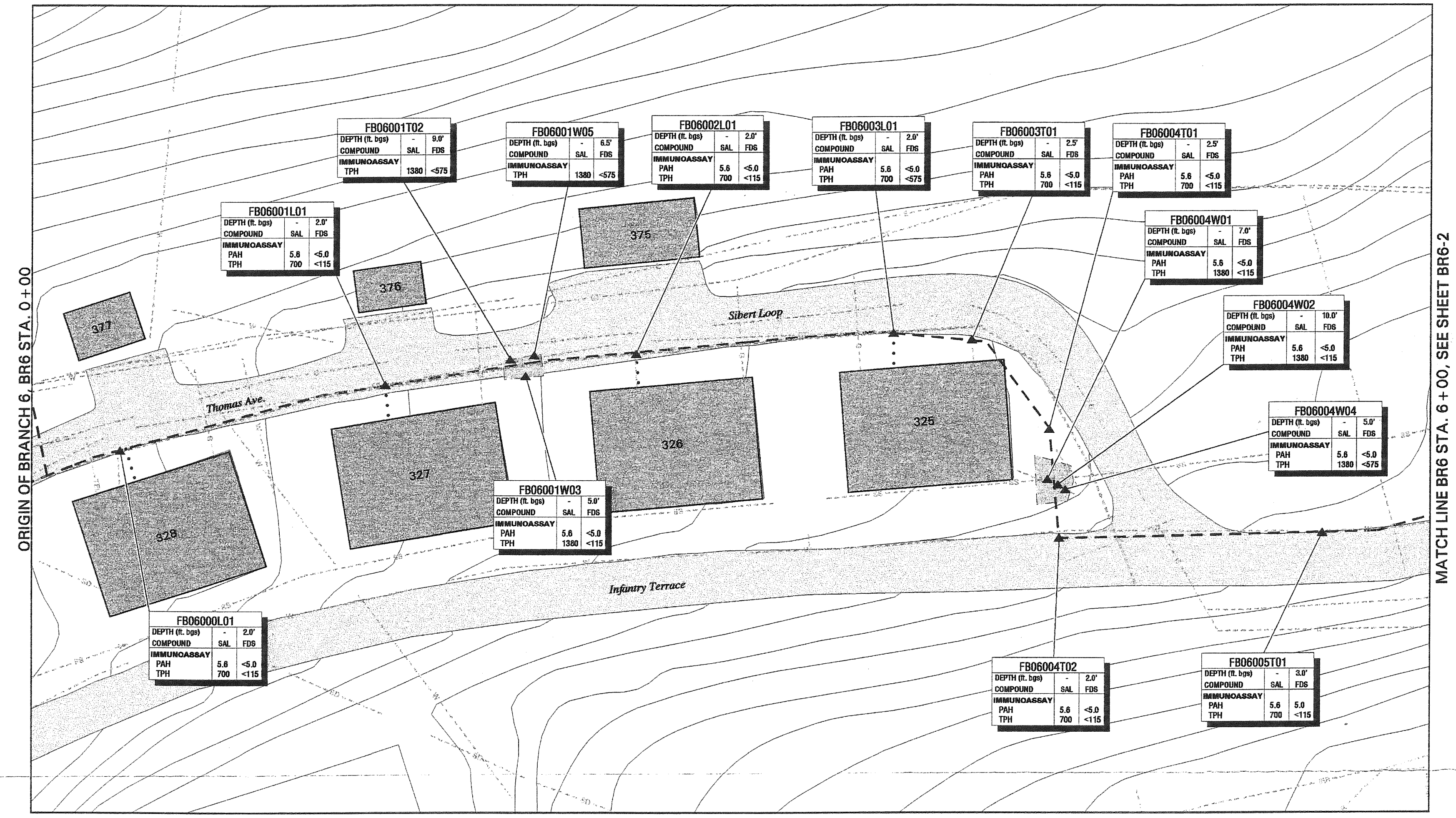
(Approximate Scale in Feet)



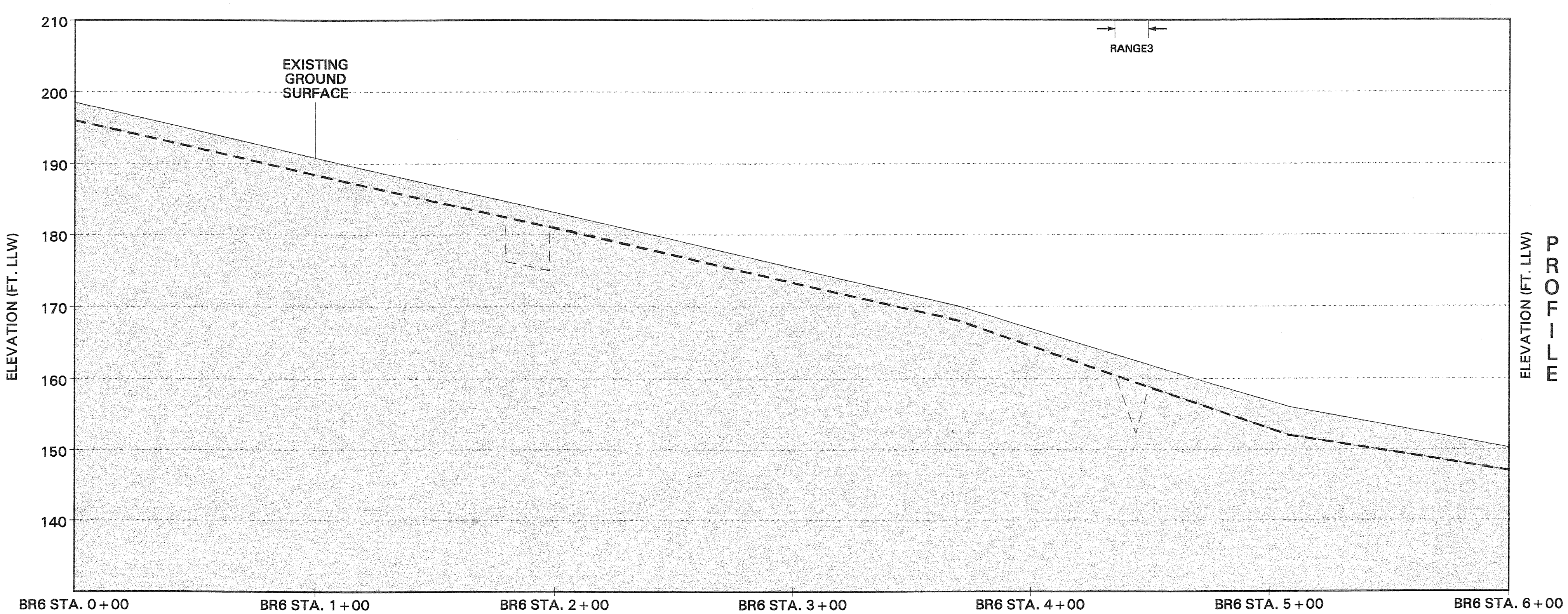
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR6-1

April 2007
EKI A70004.16
Figure 8



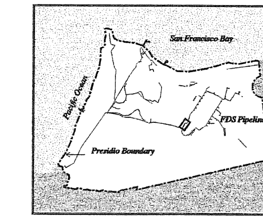
PLAN VIEW



HORIZONTAL SCALE: 1" = 30'

VERTICAL SCALE: 1" = 10'

PROFILE



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	RANGE3
Total Petroleum Hydrocarbons (mg/kg)	<3 - 4
BETX (mg/kg)	
Benzene	<0.006
Ethylbenzne	<0.006
Toluene	<0.006
Xylenes (total)	<0.006
Total Carcinogenic PAHs (mg/kg)	NA
Immunoassay-PAHs (mg/kg)	<5.6
SPLP (µg/l)	
Diesel Range	NA
Gasoline Range	NA
Benzene	NA
Ethylbenzene	NA
Toluene	NA
Xylenes (m&p-)	NA
Xylenes (o-)	NA

RANGE3 = Postpiles 058, 061, 062

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

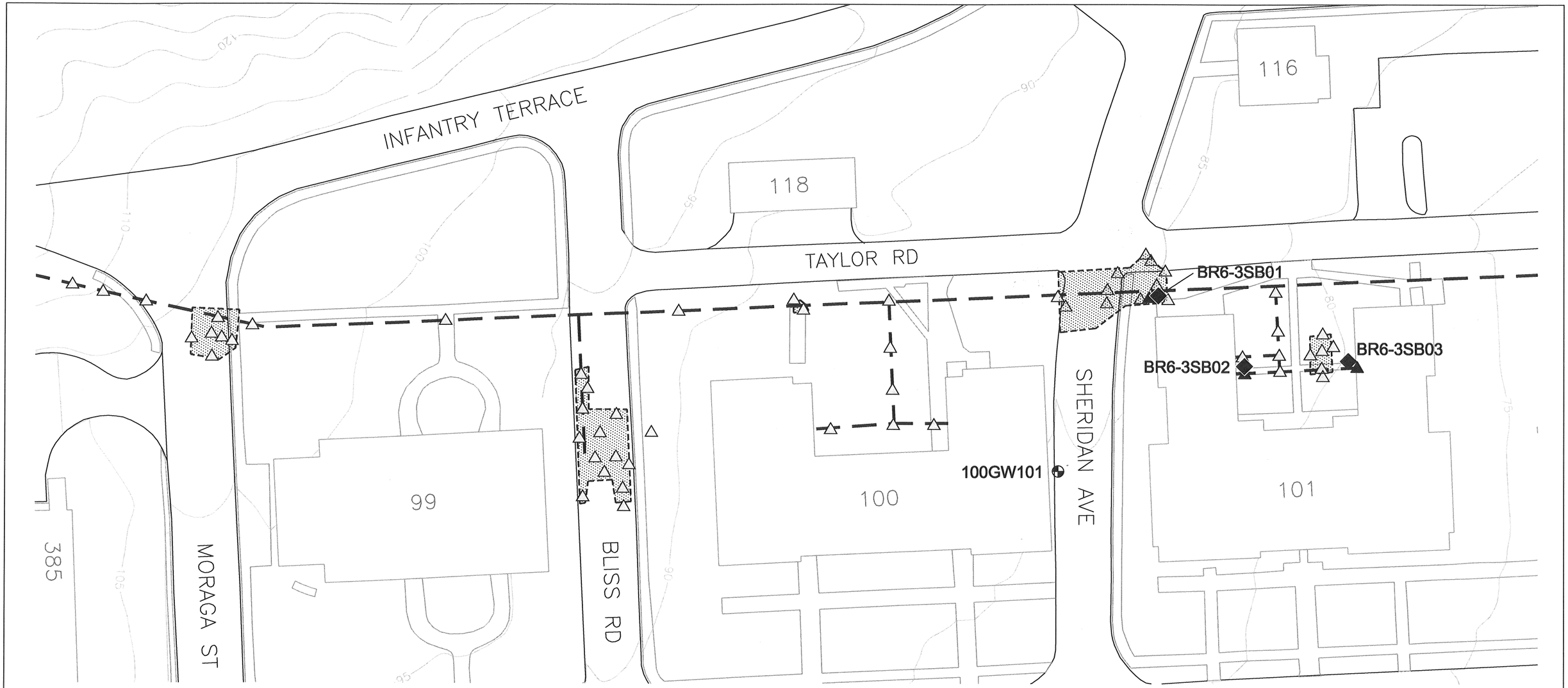
DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT

BR6 STATION 0+00 TO 6+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET BR6-1
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ⊕ Groundwater Monitoring Well
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▨ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

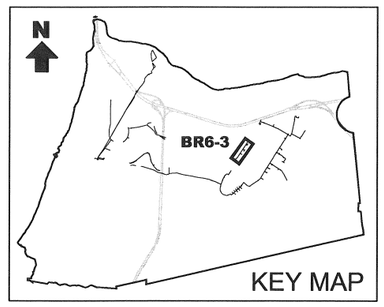
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

(Approximate Scale in Feet)

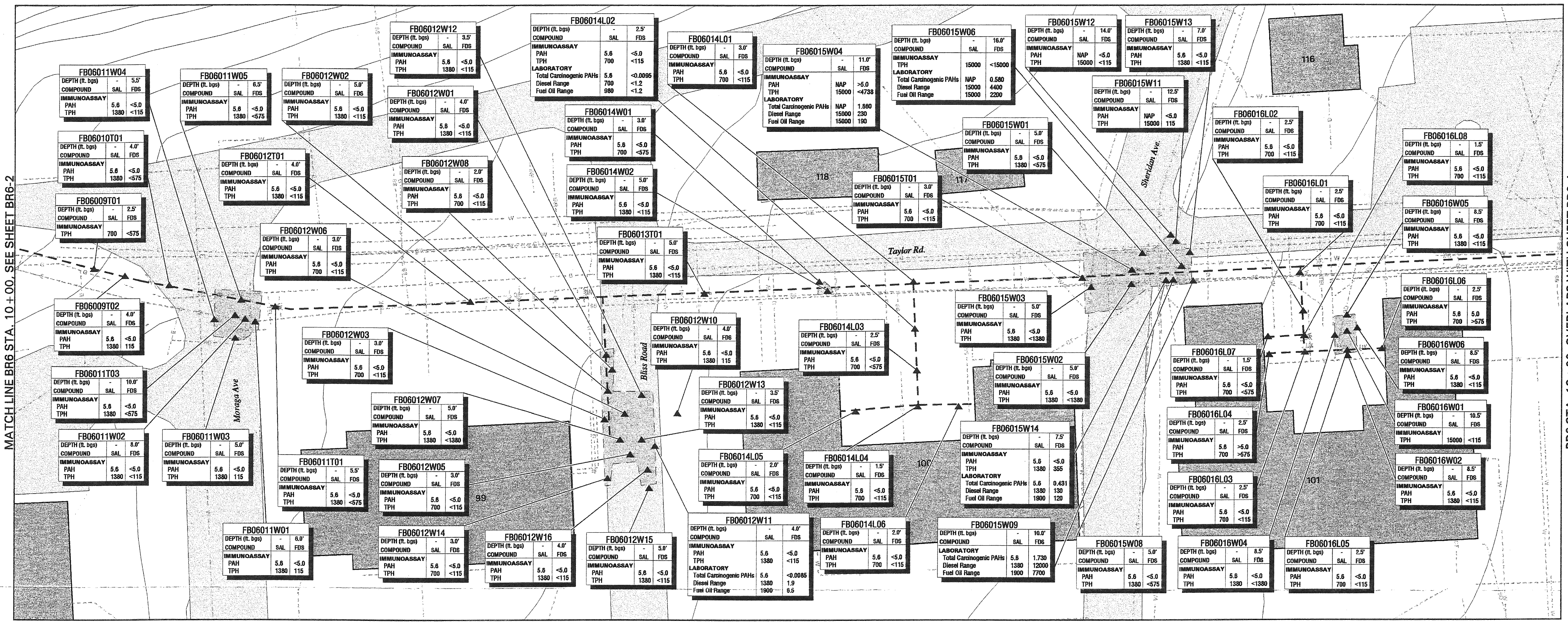


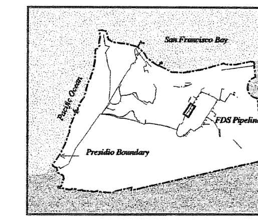
KEY MAP

Erler & Kalinowski, Inc.

Proposed Sampling Locations at Fuel Distribution System Section BR6-3

April 2007
EKI A70004.16
Figure 9





FDS INDEX MAP (DRAWN AT 1' = 60,000')

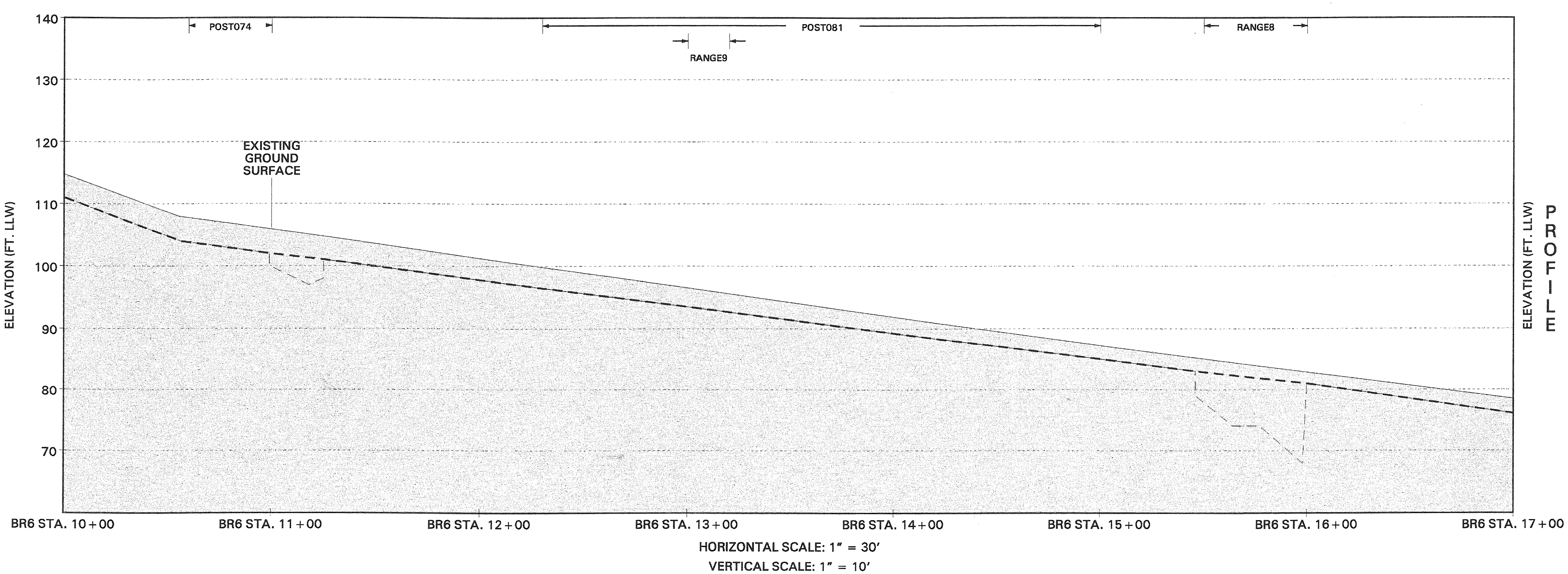
Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30 feet



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST074	POST081
Total Petroleum Hydrocarbons (mg/kg)	83	32
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	0.163	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6
SPLP (µg/l)		
Diesel Range	NA	NA
Gasoline Range	NA	NA
Benzene	NA	NA
Ethylbenzene	NA	NA
Toluene	NA	NA
Xylenes (m&p-)	NA	NA
Xylenes (o-)	NA	NA

RANGE 8 = Postpiles 064, 065, 067, 073, 104, 107, 108, 114-117
RANGE 9 = Postpiles 074, 095-097, 101-103

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST074	POST081
Total Petroleum Hydrocarbons (mg/kg)	83	32
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	0.163	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6
SPLP (µg/l)		
Diesel Range	NA	NA
Gasoline Range	NA	NA
Benzene	NA	NA
Ethylbenzene	NA	NA
Toluene	NA	NA
Xylenes (m&p-)	NA	NA
Xylenes (o-)	NA	NA

RANGE 8 = Postpiles 064, 065, 067, 073, 104, 107, 108, 114-117
RANGE 9 = Postpiles 074, 095-097, 101-103

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

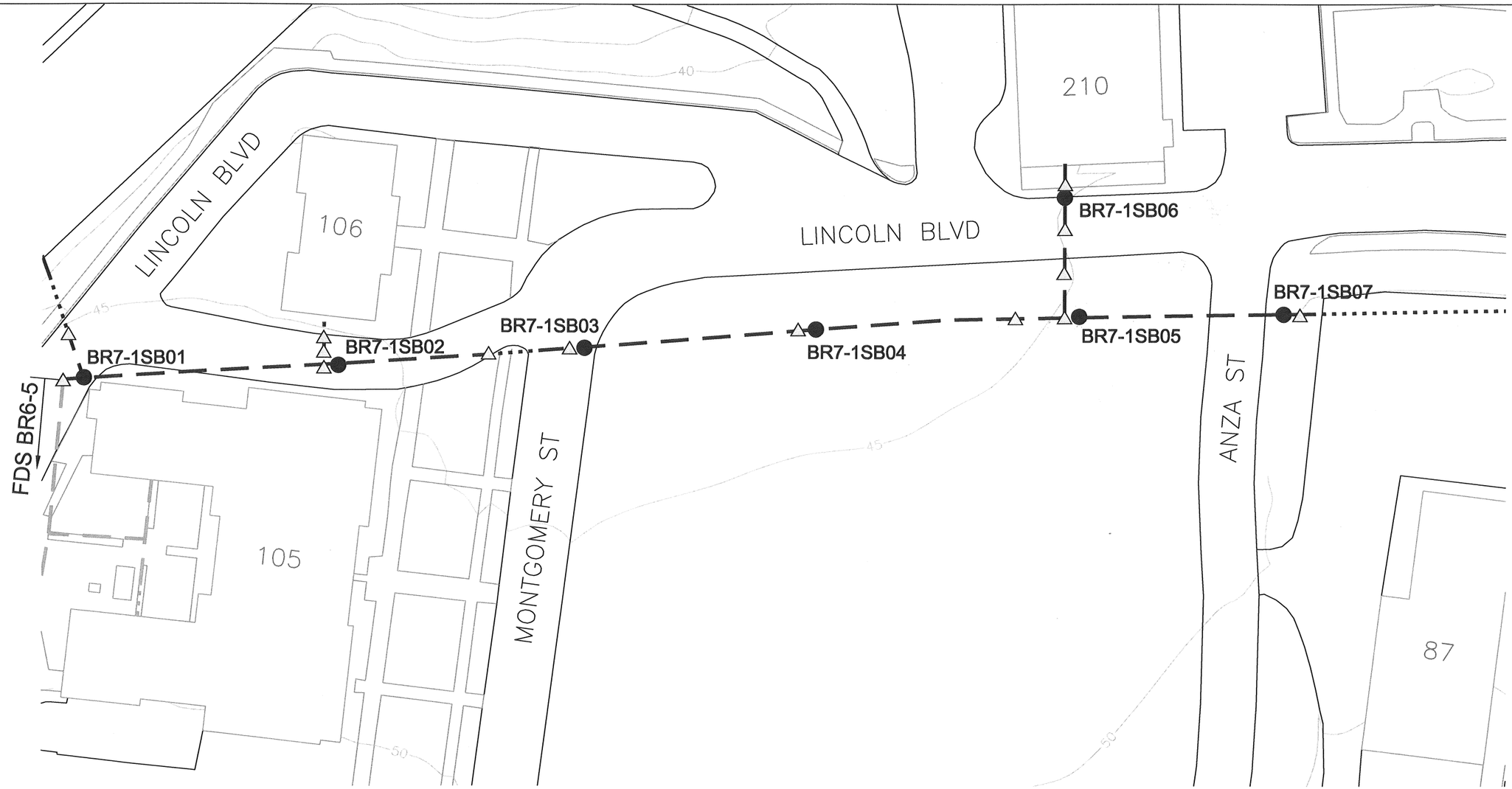
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT BR6 STATION 10+00 TO 17+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET BR6-3
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- ▪▪▪▪▪▪▪ FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)

Abbreviation:

FDS	Fuel Distribution System

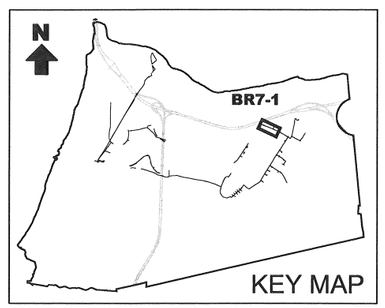
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

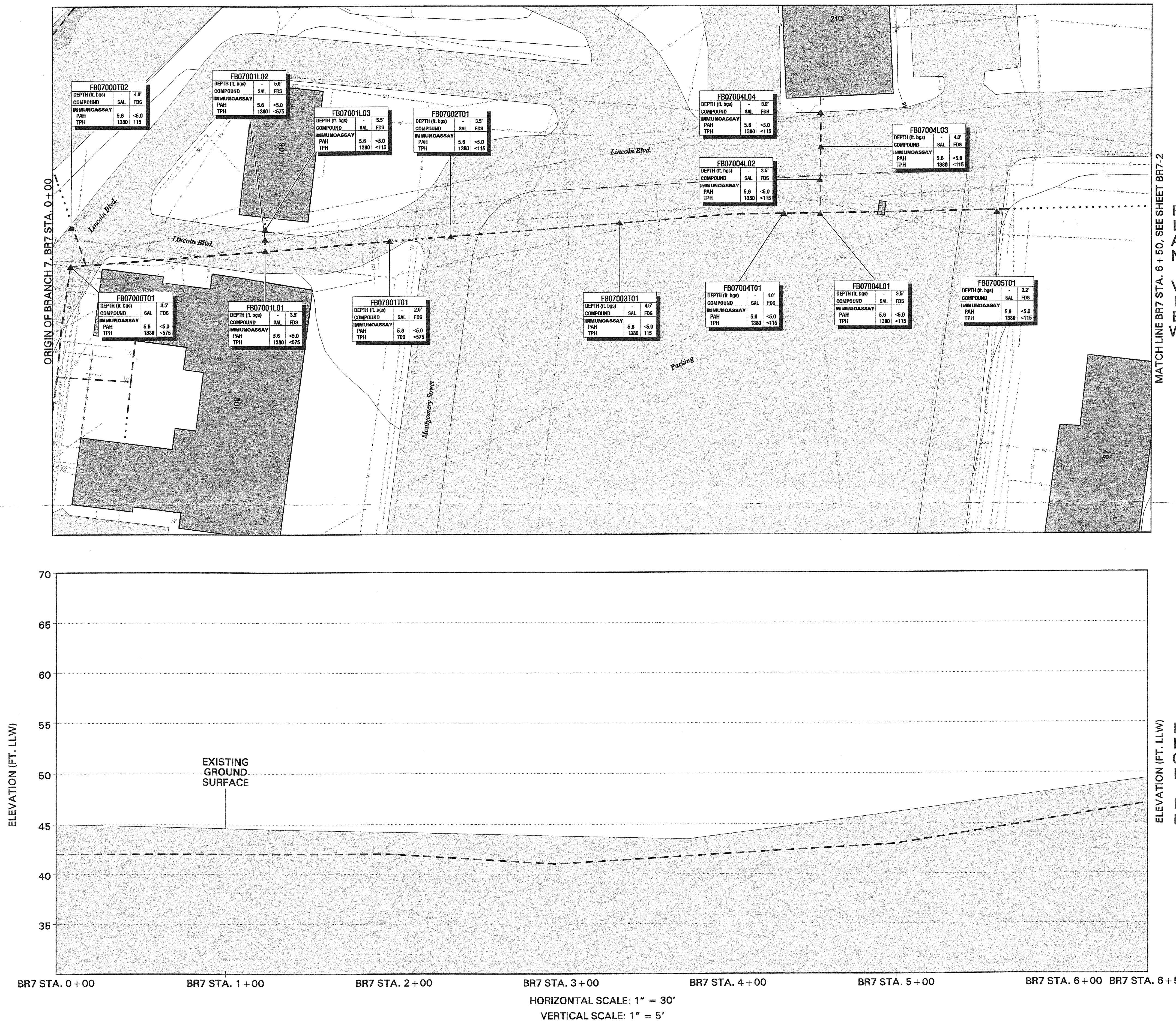
(Approximate Scale in Feet)

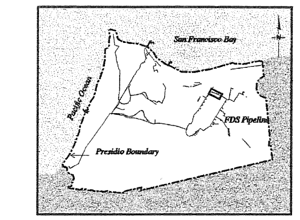


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR7-1

April 2007
EKI A70004.16
Figure 10





FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30 feet

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

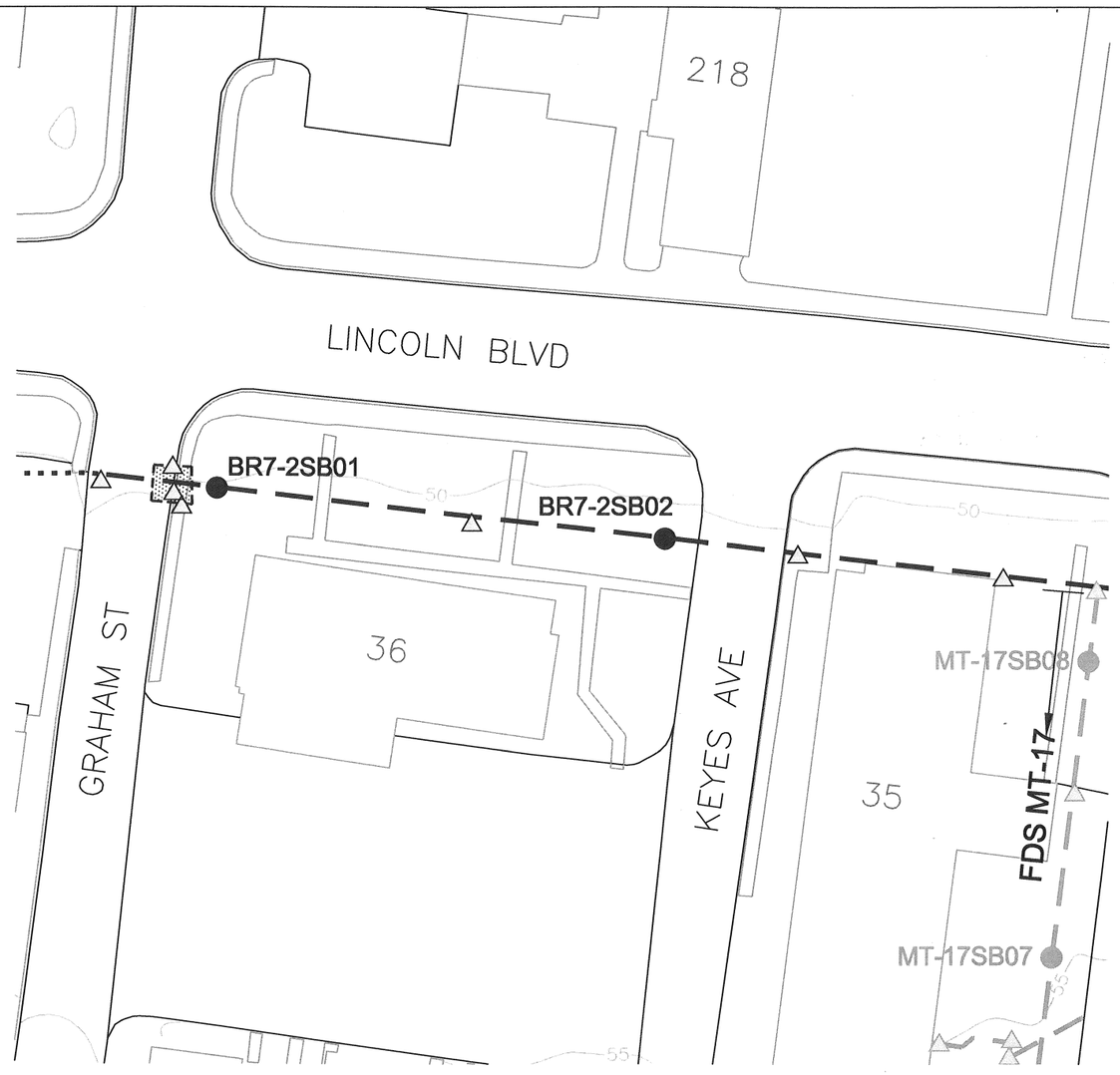
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT
BR7 STATION 0+00 TO 6+50

SUBMITTED: | DATE APPROVED: | SCALE: | SPEC. No.
SHEET BR7-1 | FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

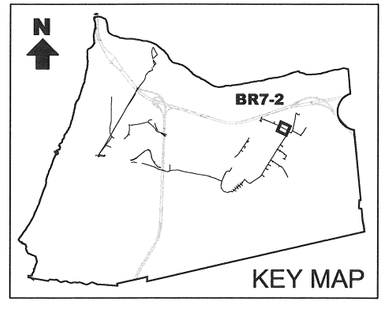
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

(Approximate Scale in Feet)

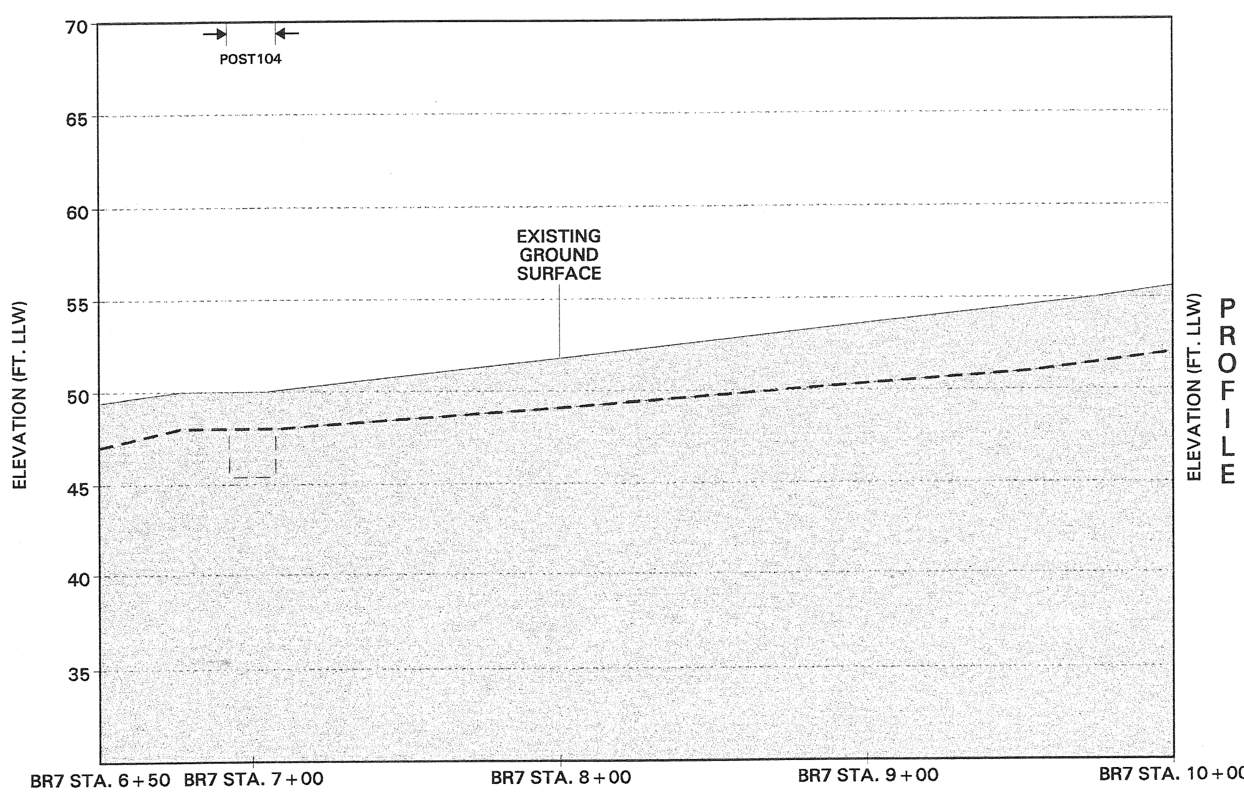


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR7-2

April 2007
EKI A70004.16
Figure 11

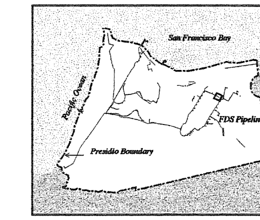
PLAN VIEW



PROFILE

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 5'

NOTE: PIPELINE FROM BRANCH 7, STATION 6+76.28 TO BRANCH 7, STATION 7+04 WAS EITHER NOT FOUND IN THE FIELD OR WAS PREVIOUSLY REMOVED.



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	POST104
Total Petroleum Hydrocarbons (mg/kg)	98
BETX (mg/kg)	
Benzene	<0.006
Ethylbenzne	<0.006
Toluene	<0.006
Xylenes (total)	<0.006
Total Carcinogenic PAHs (mg/kg)	3.19
Immunoassay-PAHs (mg/kg)	RS
SPLP (µg/l)	
Diesel Range	NA
Gasoline Range	NA
Benzene	NA
Ethylbenzene	NA
Toluene	NA
Xylenes (m&p-)	NA
Xylenes (o-)	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

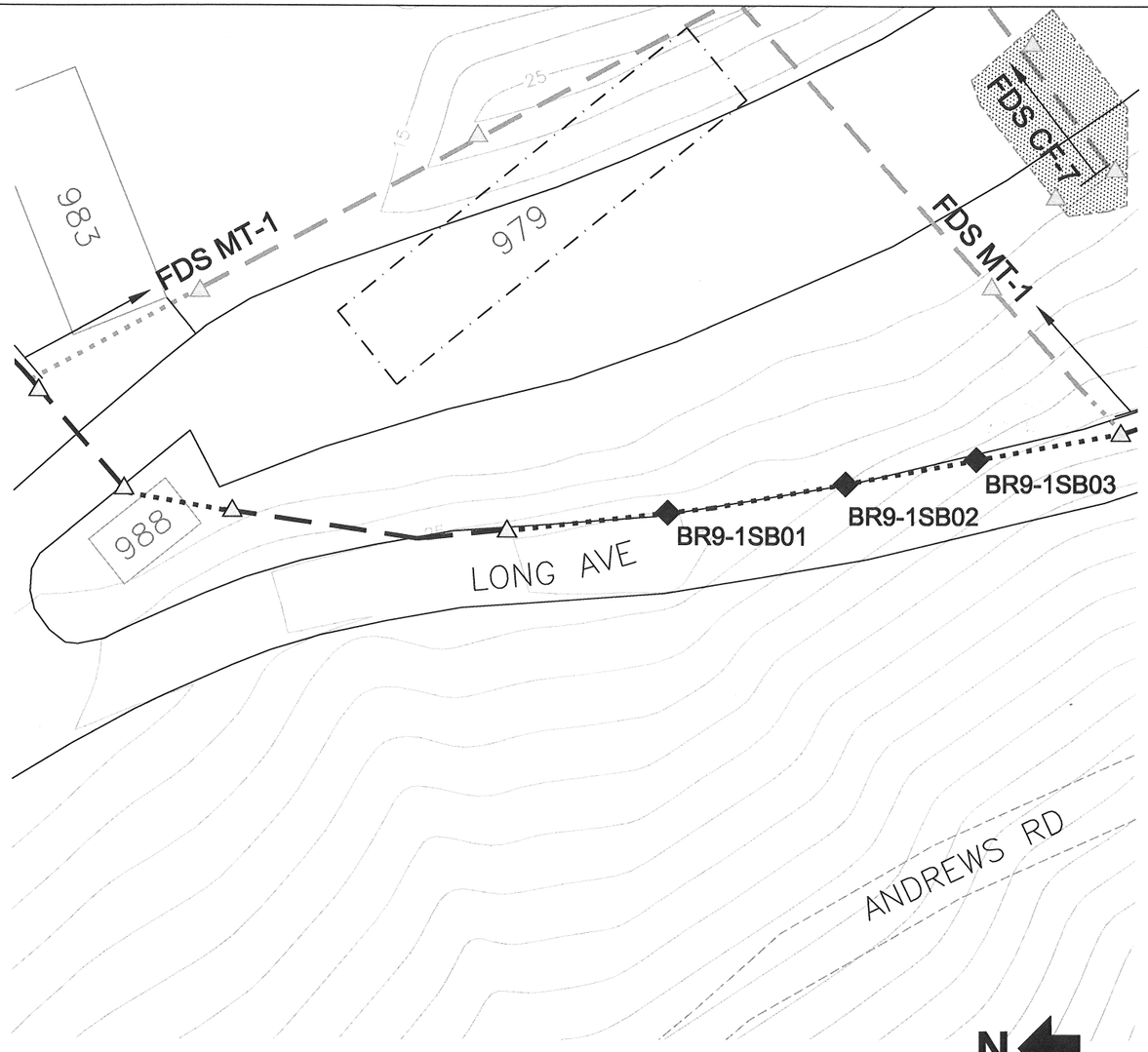
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO — CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT BR7 STATION 6+50 TO 9+74.33

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET BR7-2
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area
- Former Building

Abbreviation:

FDS Fuel Distribution System

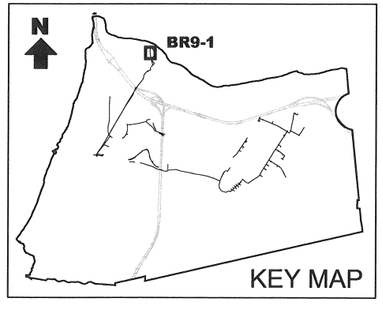
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

(Approximate Scale in Feet)

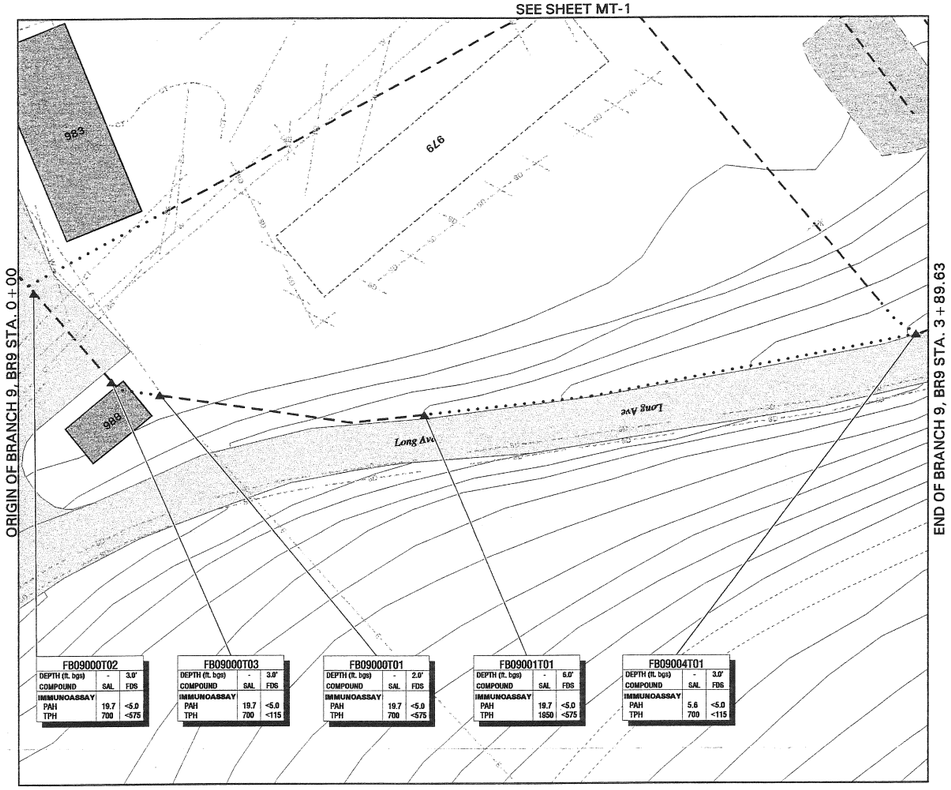


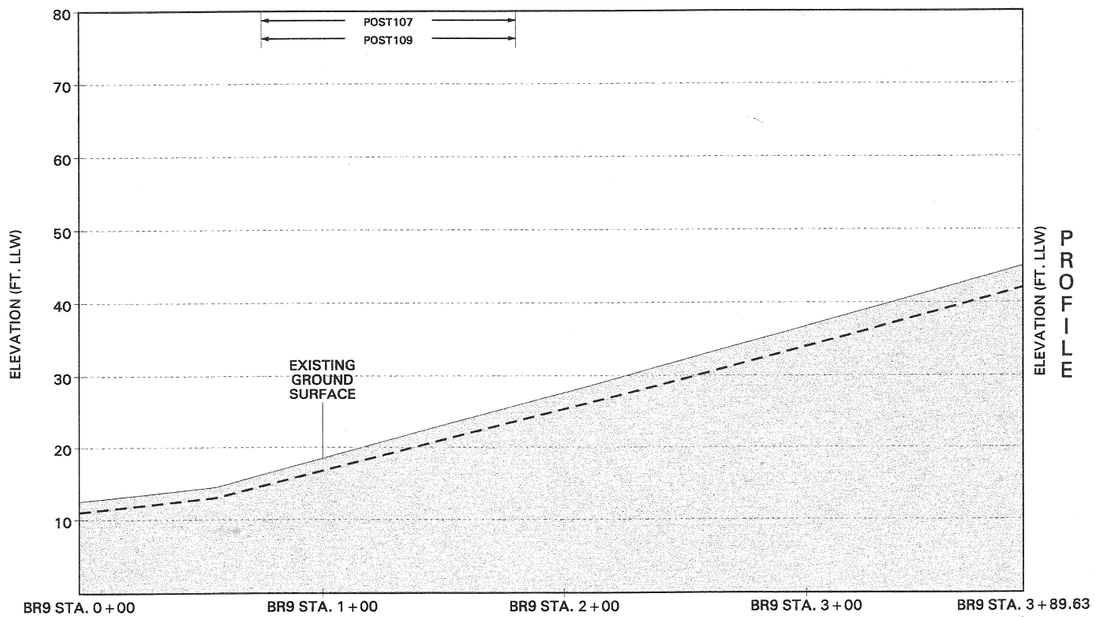
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR9-1

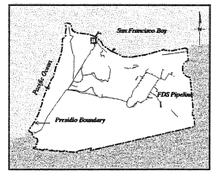
April 2007
EKI A70004.16
Figure 12

SEE SHEET MT-1





HORIZONTAL SCALE: 1″ = 30′
VERTICAL SCALE: 1″ = 10′



FDS INDEX MAP (DRAWN AT 1′ = 60,000′)

Legend:

E	Electric Line	
G	Gas Line	
IRR	Irrigation Line	
SD	Storm Drain Line	
SS	Sanitary Sewer Line	
T	Telephone Line	
W	Water Line	
CT	Cable TV Line	
FO	Fiber Optic Line	
SL	Street Light Line	
U	Unknown Line	
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned	
	Pavement	
983	Building and Identification No.	
	Excavation	
	Limit of Excavation	
	Removed FDS Pipeline	
	Abandoned In Place FDS Pipeline	
	Previously Removed FDS Pipeline	
	Topographic Contour (Contour Interval: 5ft.)	
	Fence	
	Removed Structure (except tanks)	
▲	Soil Sample	
FB0112T02	Soil Sample Identification No.	
POST01B	LTTD Soil Sample Identification No.	
NA	Not Analyzed	
NAP	Not Applicable	
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)	
RS	Immunoassay Result Superseded by Laboratory PAH Analysis	

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

N

0 15 30
feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST107	POST109
Total Petroleum Hydrocarbons (mg/kg)	70	51
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzene	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	0.36	0.93
Immunoassay-PAHs (mg/kg)	RS	RS
SPLP (µg/l)		
Diesel Range	NA	NA
Gasoline Range	NA	NA
Benzene	NA	NA
Ethylbenzene	NA	NA
Toluene	NA	NA
Xylenes (m&p-)	NA	NA
Xylenes (o-)	NA	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

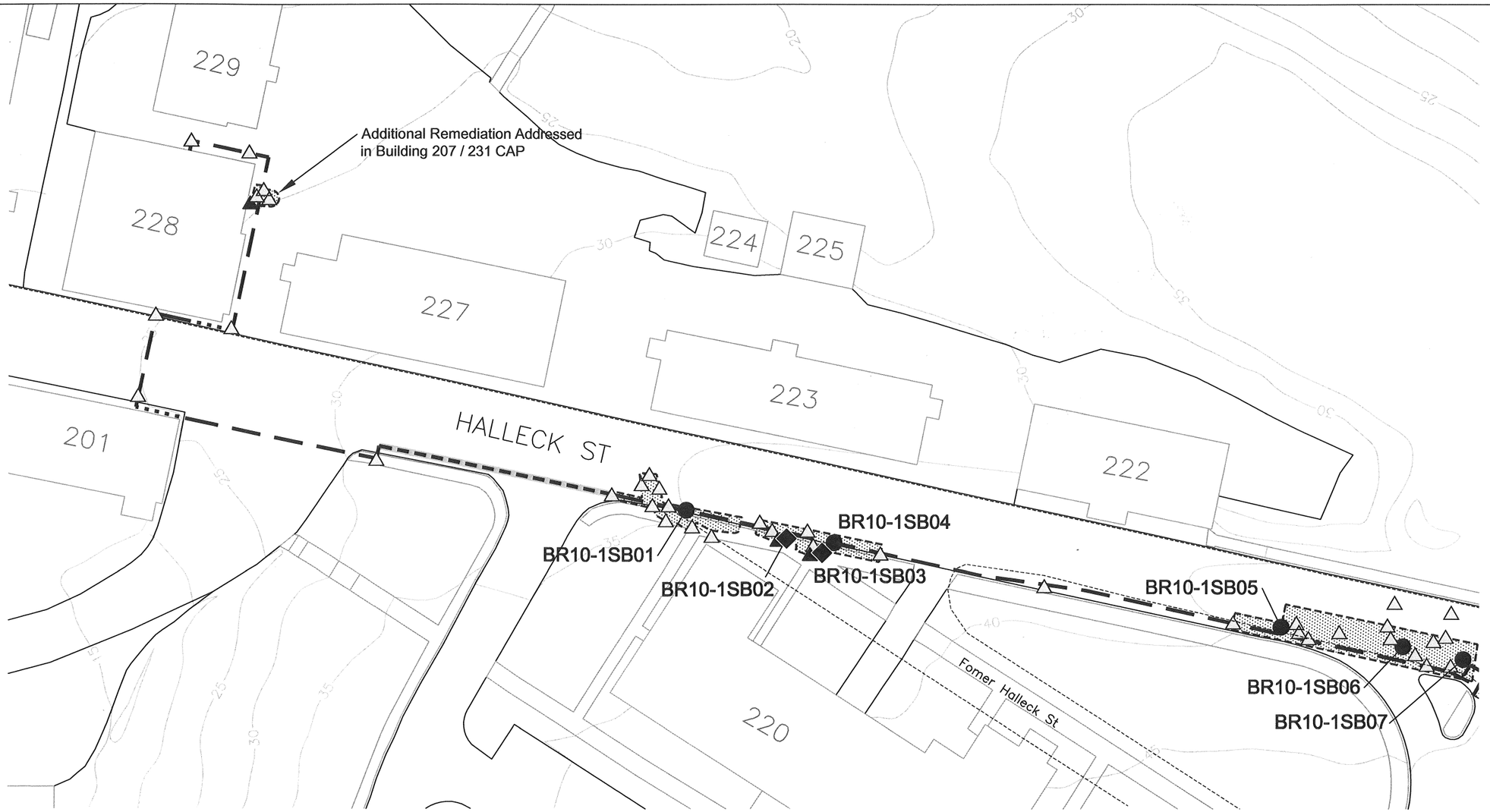
DESIGNED: E. MAKHLOUF
DRAWN:
CHECKED: I. KENNEDY

PRESIDIO OF SAN FRANCISCO CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR9 STATION 0+00 TO 3+89.63

SUBMITTED: DATE APPROVED:
SCALE: SPEC. No.
SHEET BR9-1 FILE No.

file=mm-br9-1.prn file=mm-core.prn 04/08/99 20:18:58 Tue



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

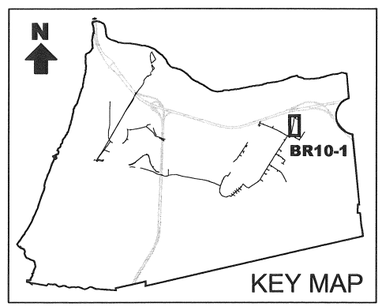
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

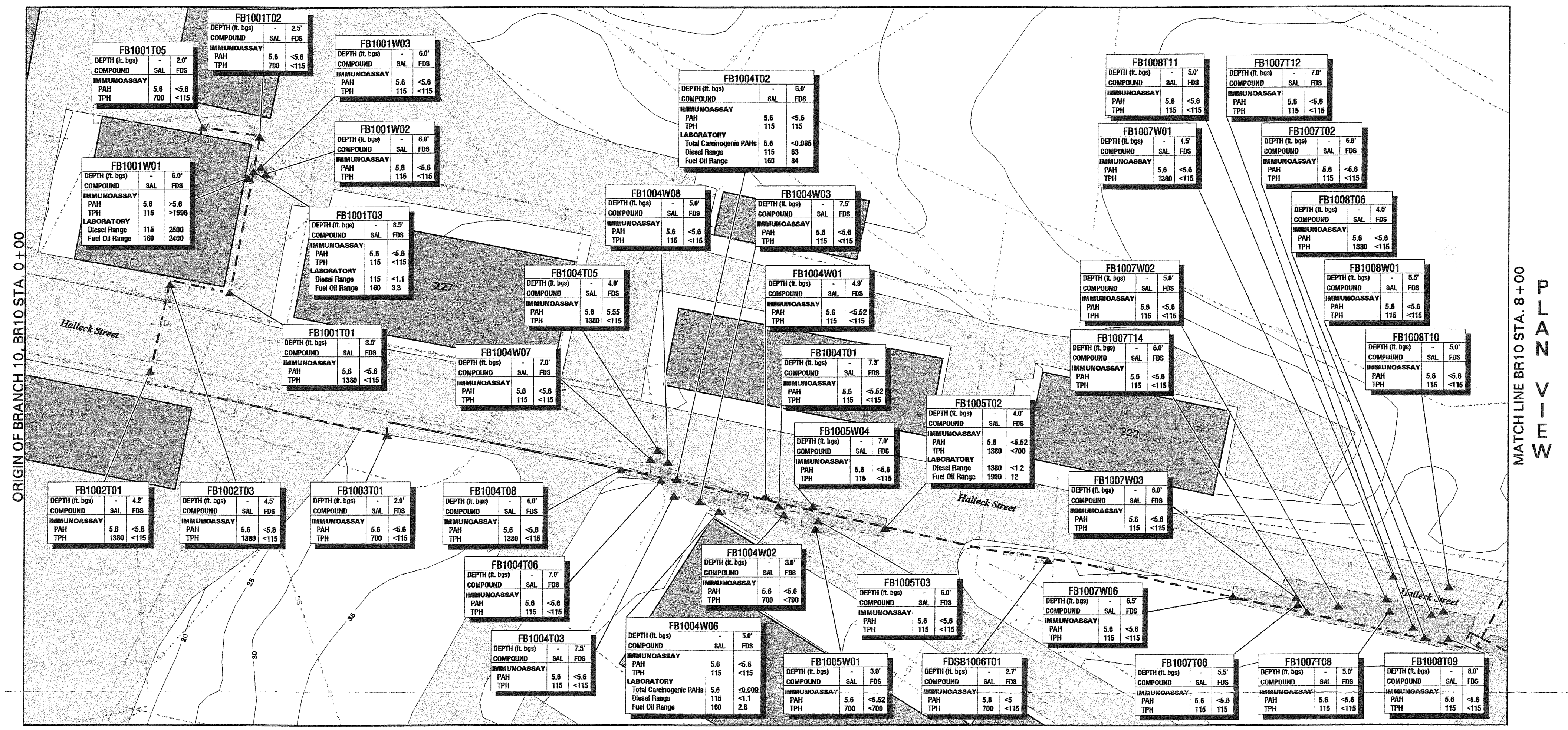
(Approximate Scale in Feet)

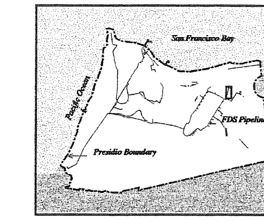


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR10-1

April 2007
EKI A70004.16
Figure 13





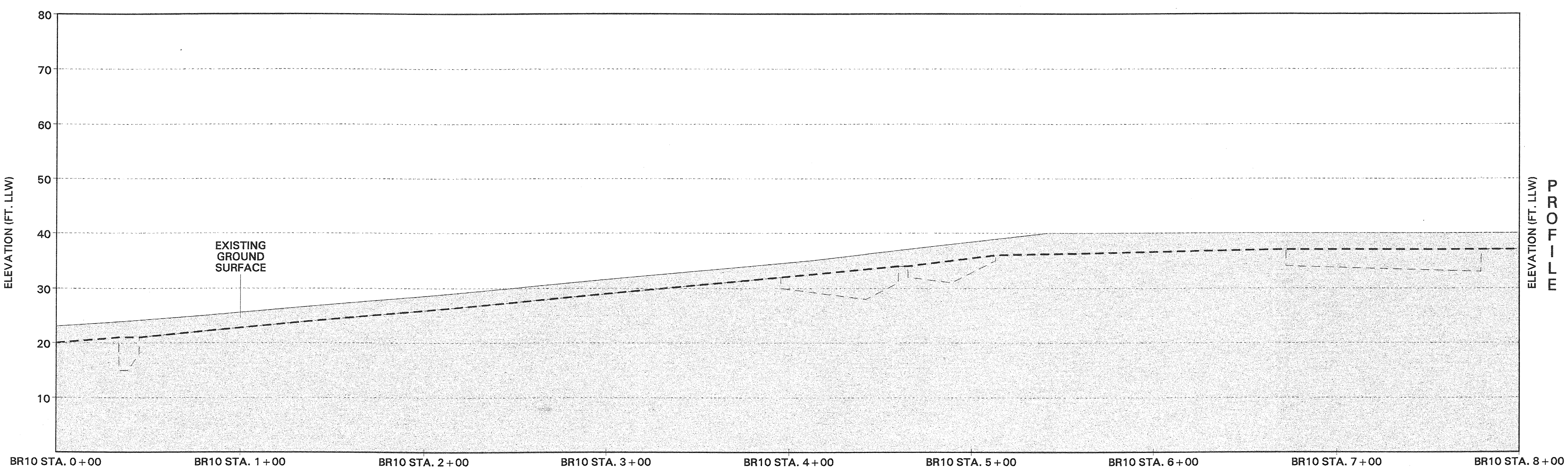
FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

0 15 30
feet

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

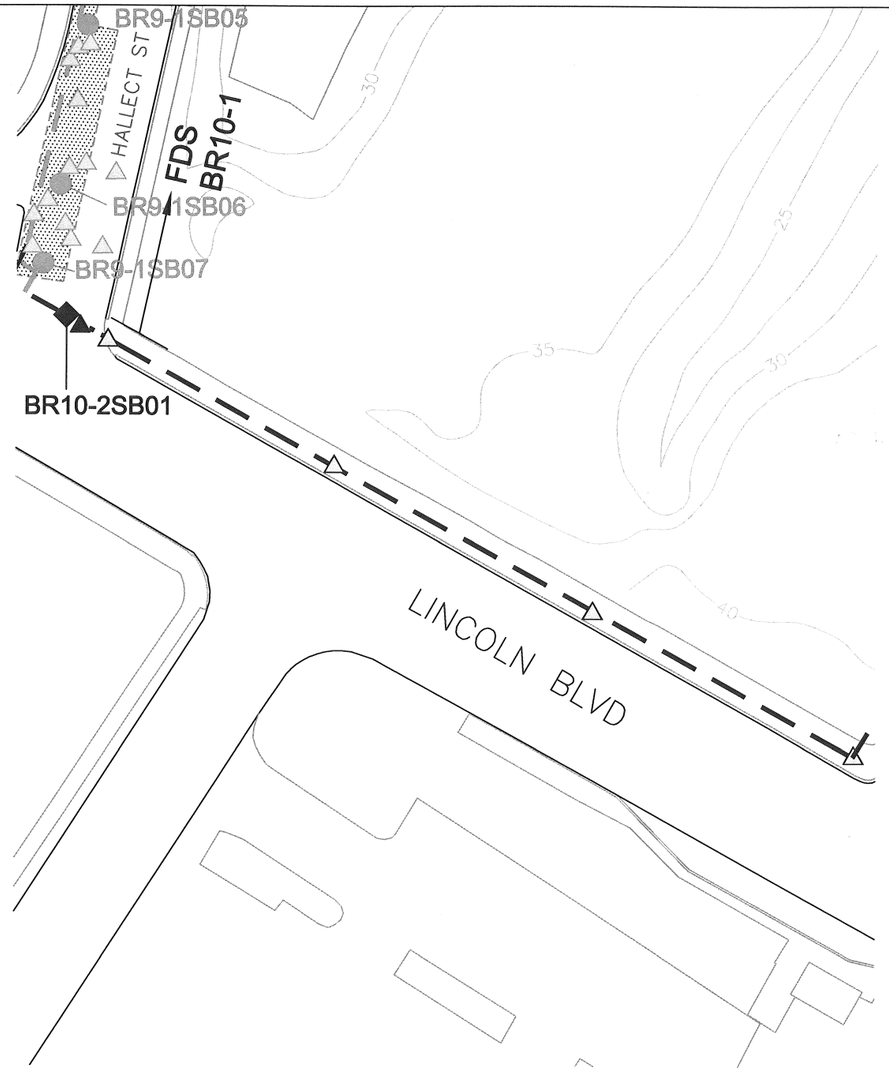
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT BR10 STATION 0+00 TO 8+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET BR10-1
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ● Proposed Overburden Soil Sampling Location
- ------- FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▒ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

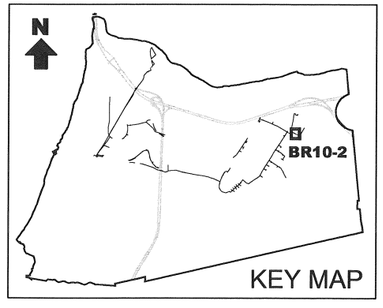
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

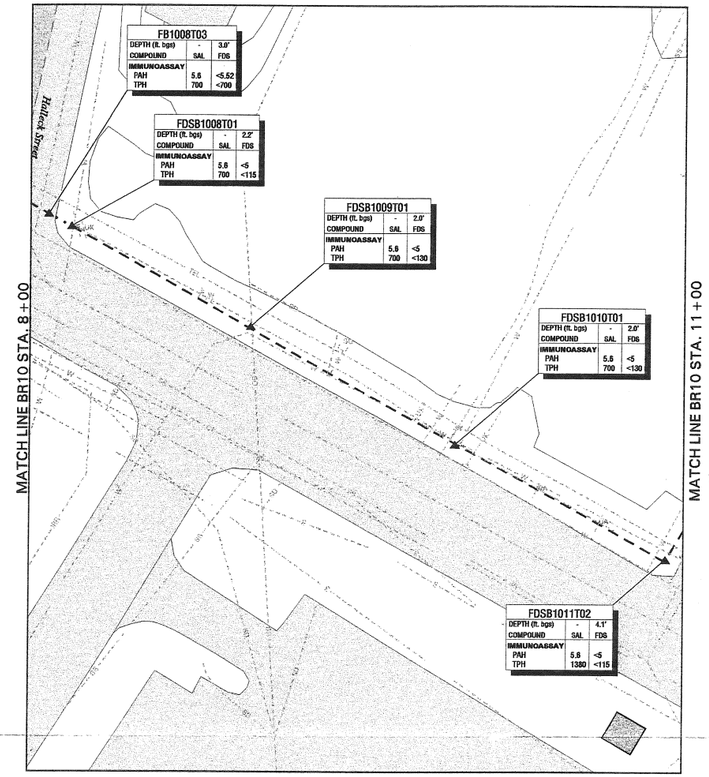
(Approximate Scale in Feet)

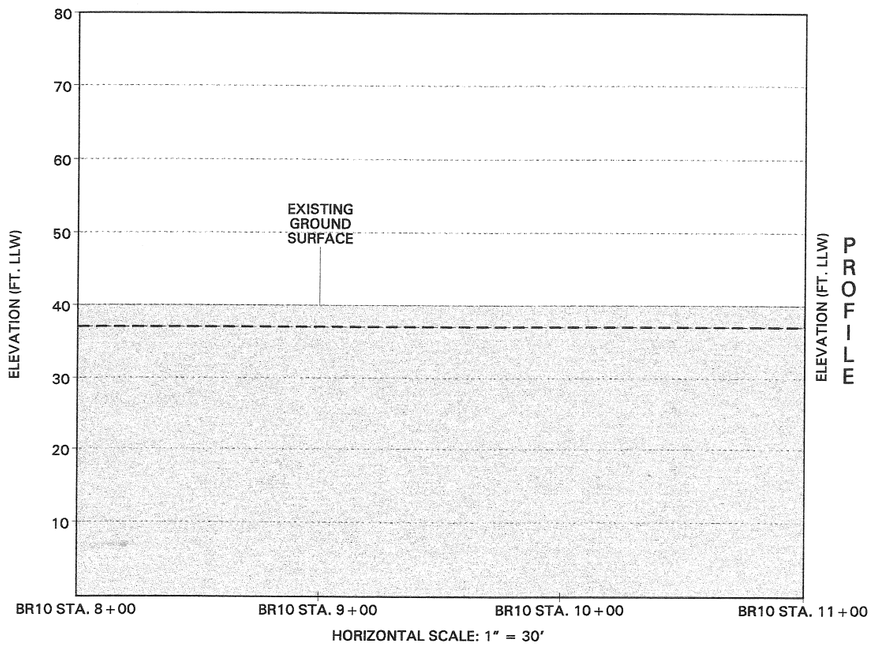


Erler & Kalinowski, Inc.

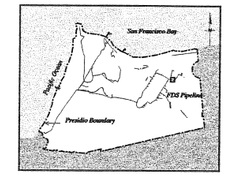
Proposed Sampling Locations
at Fuel Distribution System
Section BR10-2

April 2007
EKI A70004.16
Figure 14





HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	UTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no UTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-09	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

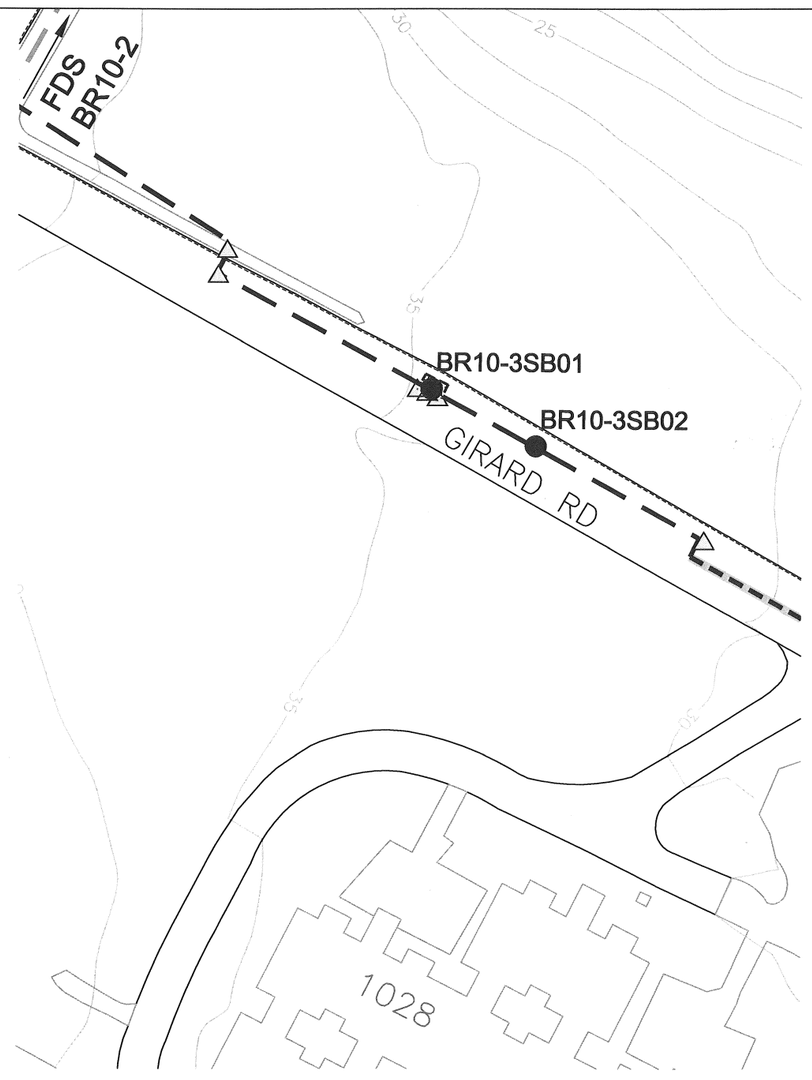
DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:
SUBMITTED:
DATE APPROVED:

PRESIDIO OF SAN FRANCISCO CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR10 STATION 8+00 TO 11+00

SCALE:
SHEET: BR10-2
FILE No.
CONT. No.

fds-ram-br10-2.pre file:ram-conc.ami 04/08/09 20:23:21 Tue



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)

Abbreviation:

FDS Fuel Distribution System

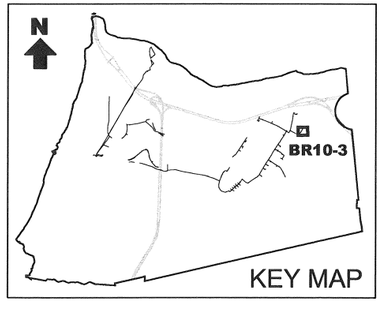
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

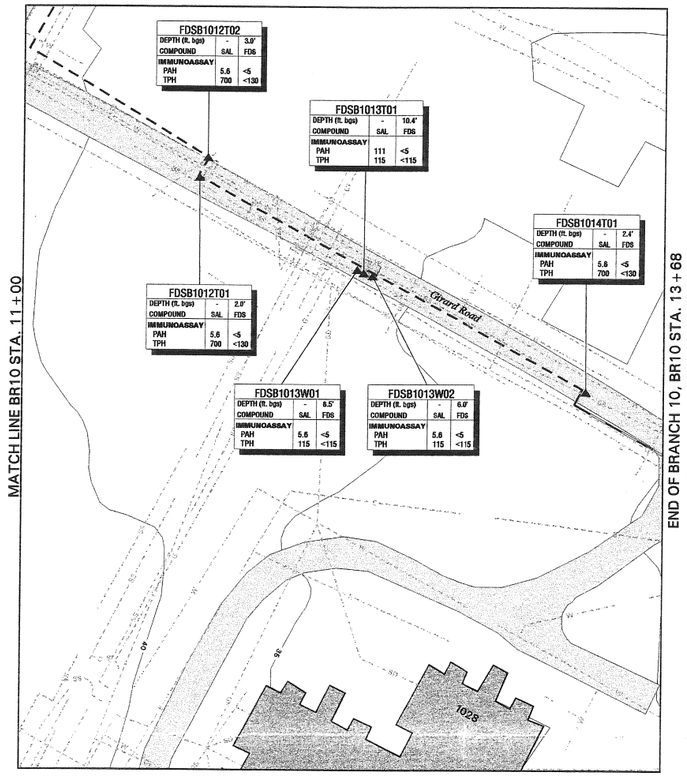
(Approximate Scale in Feet)

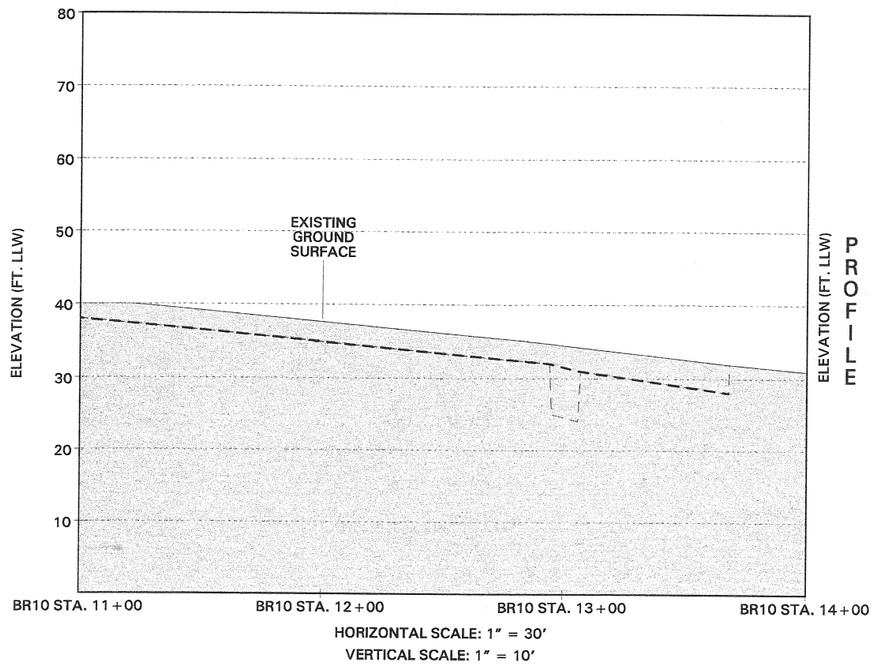


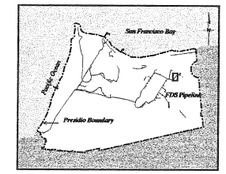
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR10-3

April 2007
EKI A70004.16
Figure 15







FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
1028	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned in Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

REVISION	DATE	DESCRIPTION	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE	

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

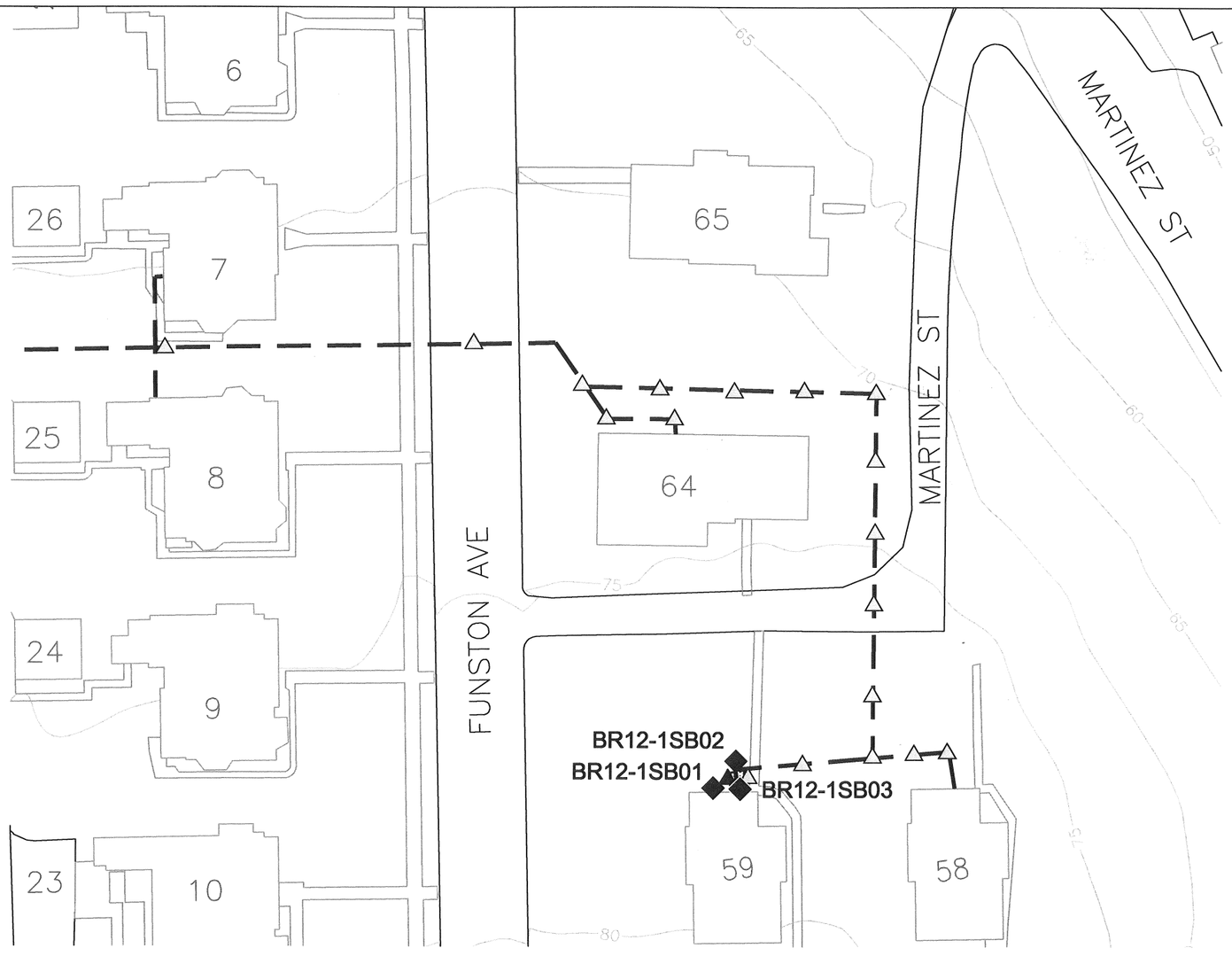
DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:
SUBMITTED:
DATE APPROVED:

PRESIDIO OF SAN FRANCISCO, CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR10 STATION 11+00 TO 13+68

SCALE:
SPEC. No.
SHEET BR10-3
FILE No.

f:\dream\br10-3.ps f:\dream\ora.ini 04/16/99,12:13:26,Al



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)

Abbreviation:

FDS Fuel Distribution System

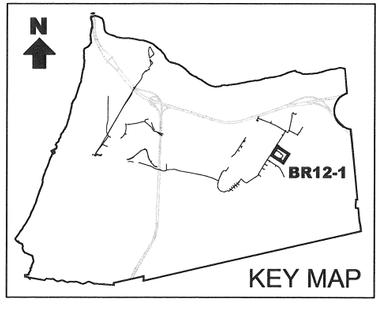
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

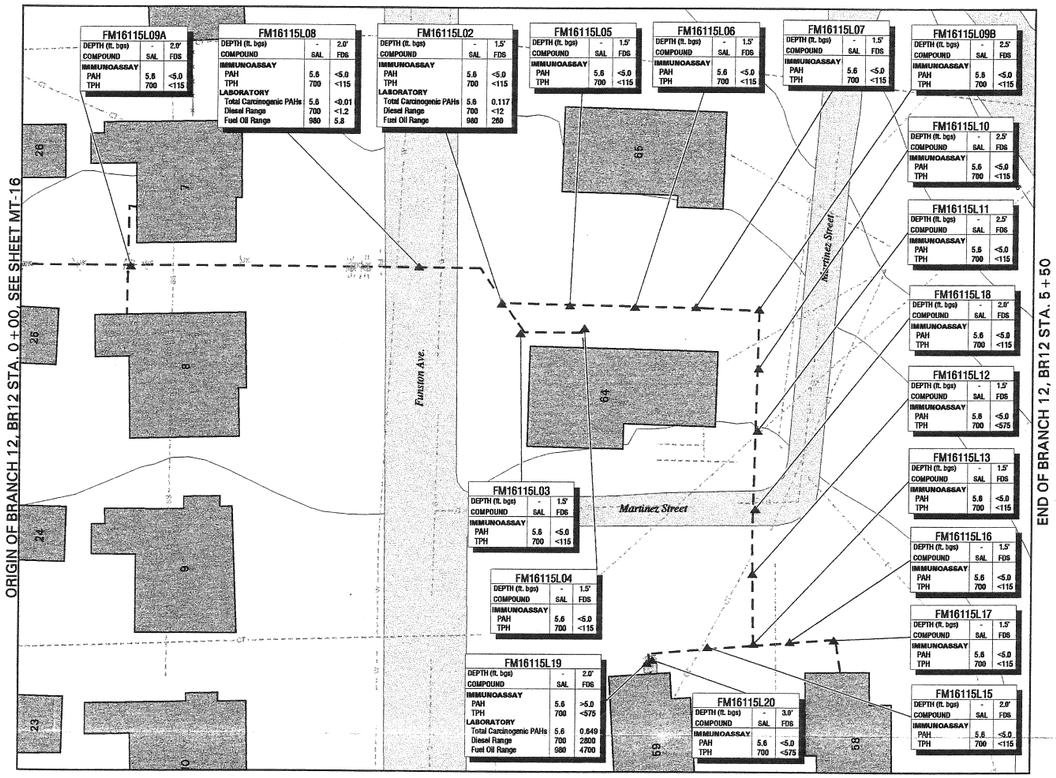
(Approximate Scale in Feet)

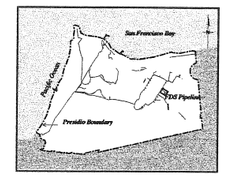


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR12-1

April 2007
EKI A70004.16
Figure 16





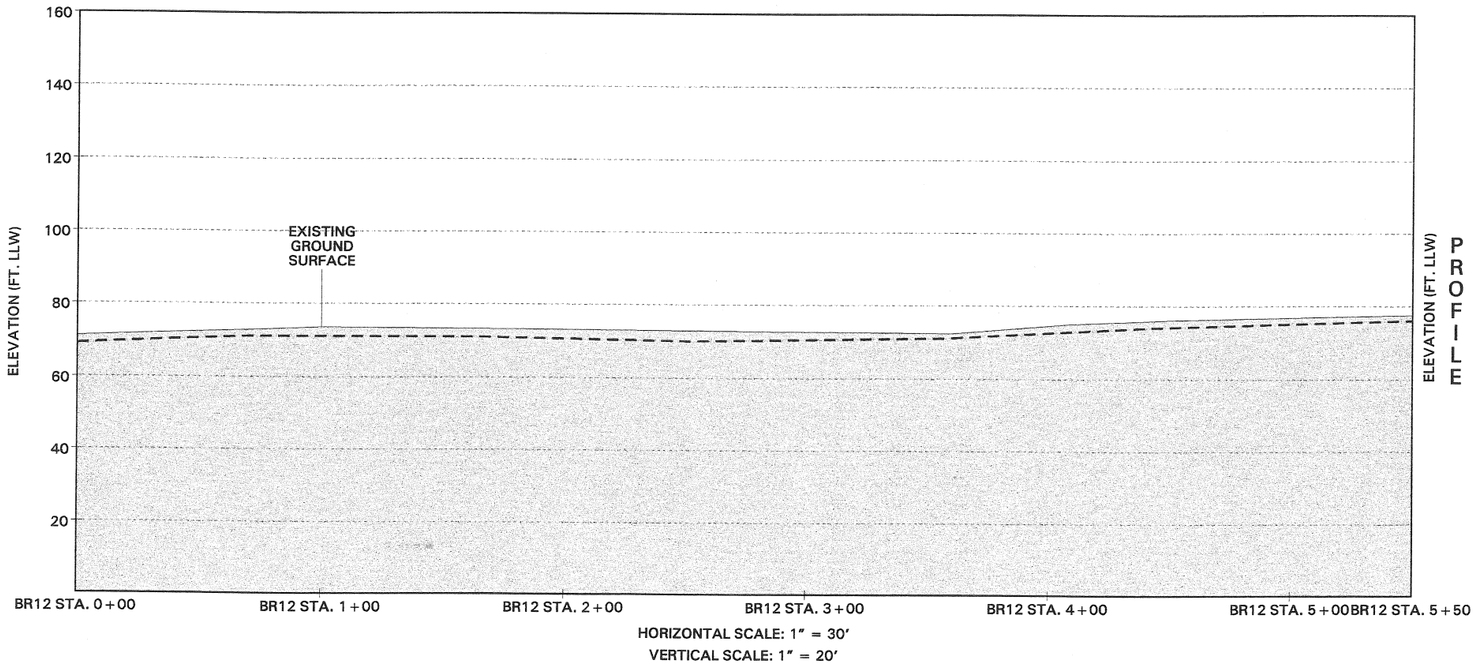
FDS INDEX MAP (DRAWN AT 1" = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5Ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1999)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 20'

0 15 30
feet

REVISION	DATE	DESCRIPTION	BY	BY
1	04-05-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

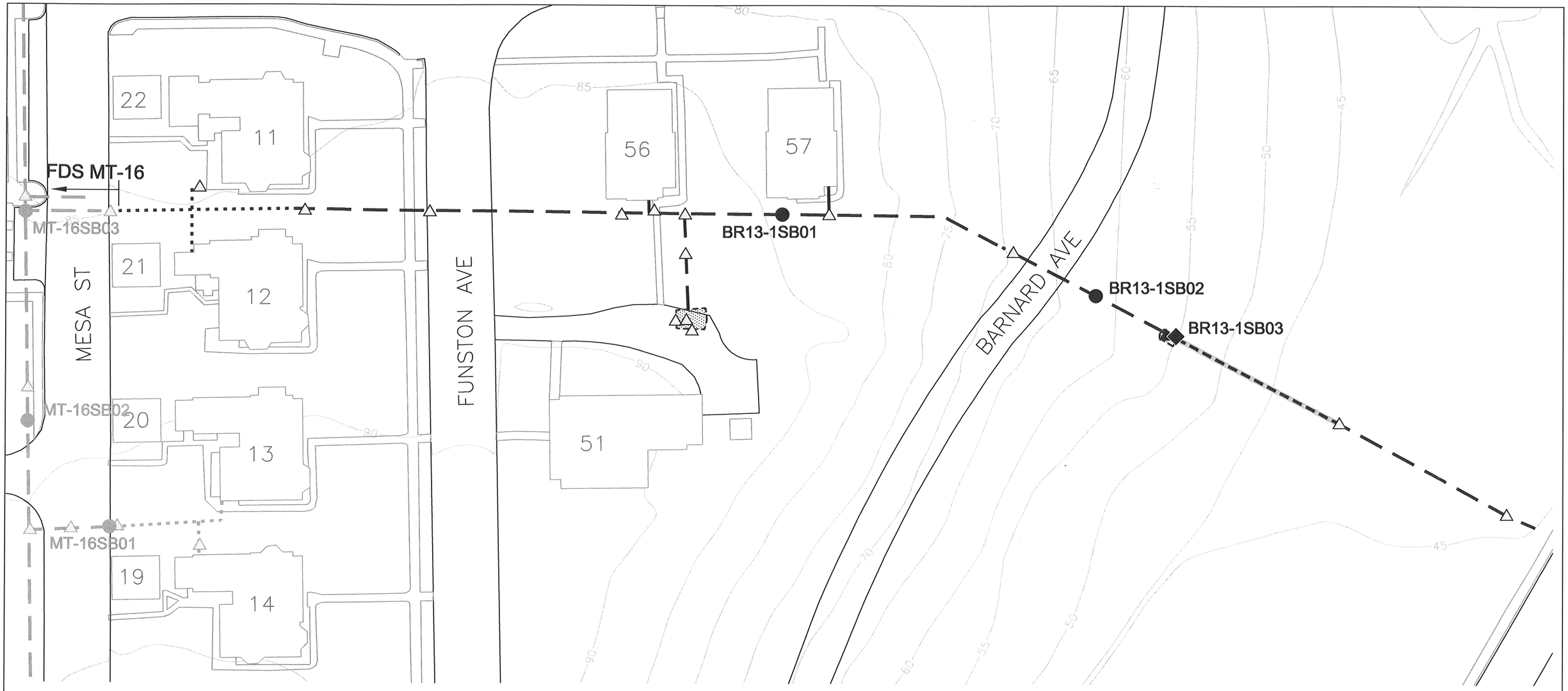
DESIGNED: E. MAKHLOUF
DRAWN:
CHECKED: I. KENNEDY
SUBMITTED:
DATE APPROVED:

PRESIDIO OF SAN FRANCISCO CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR12 STATION 0+00 TO 5+50

SCALE: SPEC. No.
SHEET BR12-1 FILE No.

fdr-ram-br12-2.ai fdr-ram-save.eml (04/13/99 11:40:10 Mon)



Legend:

- Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- Proposed Native Soil Sampling Location
- Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

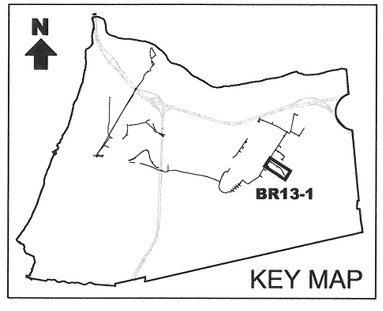
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

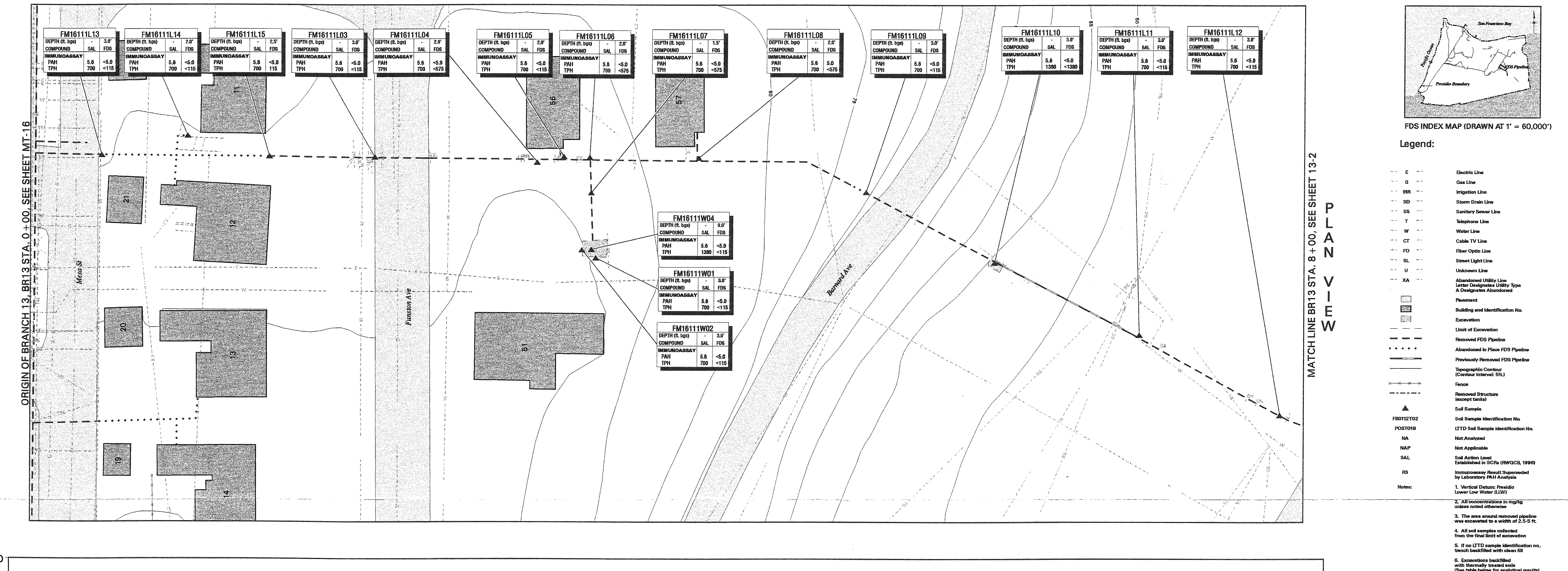
(Approximate Scale in Feet)



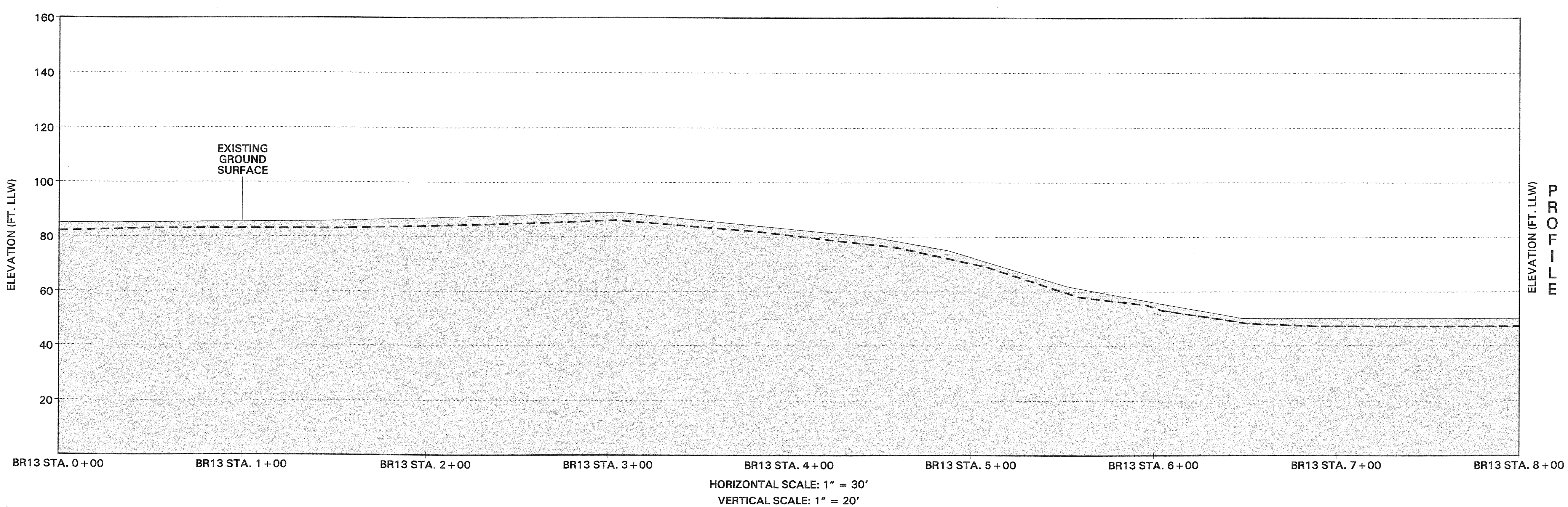
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section BR13-1

April 2007
EKI A70004.16
Figure 17



ORIGIN OF BRANCH 13, BR13 STA. 0+00, SEE SHEET MT-16
MATCH LINE BR13 STA. 8+00, SEE SHEET 13-2
PLAN VIEW
FM16111L13
FM16111L14
FM16111L15
FM16111L03
FM16111L04
FM16111L05
FM16111L06
FM16111L07
FM16111L08
FM16111L09
FM16111L10
FM16111L11
FM16111L12
FM16111W04
FM16111W01
FM16111W02
DEPTH (ft. bgs)
COMPOUND
SAL
FDS
IMMUNOASSAY
PAH
TPH
Mesa St
Funston Ave
Barnard Ave
FDS INDEX MAP (DRAWN AT 1' = 60,000')
Legend:
Electric Line
Gas Line
Irrigation Line
Storm Drain Line
Sanitary Sewer Line
Telephone Line
Water Line
Cable TV Line
Fiber Optic Line
Street Light Line
Unknown Line
Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
Pavement
Building and Identification No.
Excavation
Limit of Excavation
Removed FDS Pipeline
Abandoned in Place FDS Pipeline
Previously Removed FDS Pipeline
Topographic Contour (Contour Interval: 5ft.)
Fence
Removed Structure (except tanks)
Soil Sample
Soil Sample Identification No.
LTTD Soil Sample Identification No.
Not Analyzed
Not Applicable
Soil Action Level Established in SCRs (RWQCB, 1996)
Immunoassay Result Superseded by Laboratory PAH Analysis
Notes:
1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no. trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

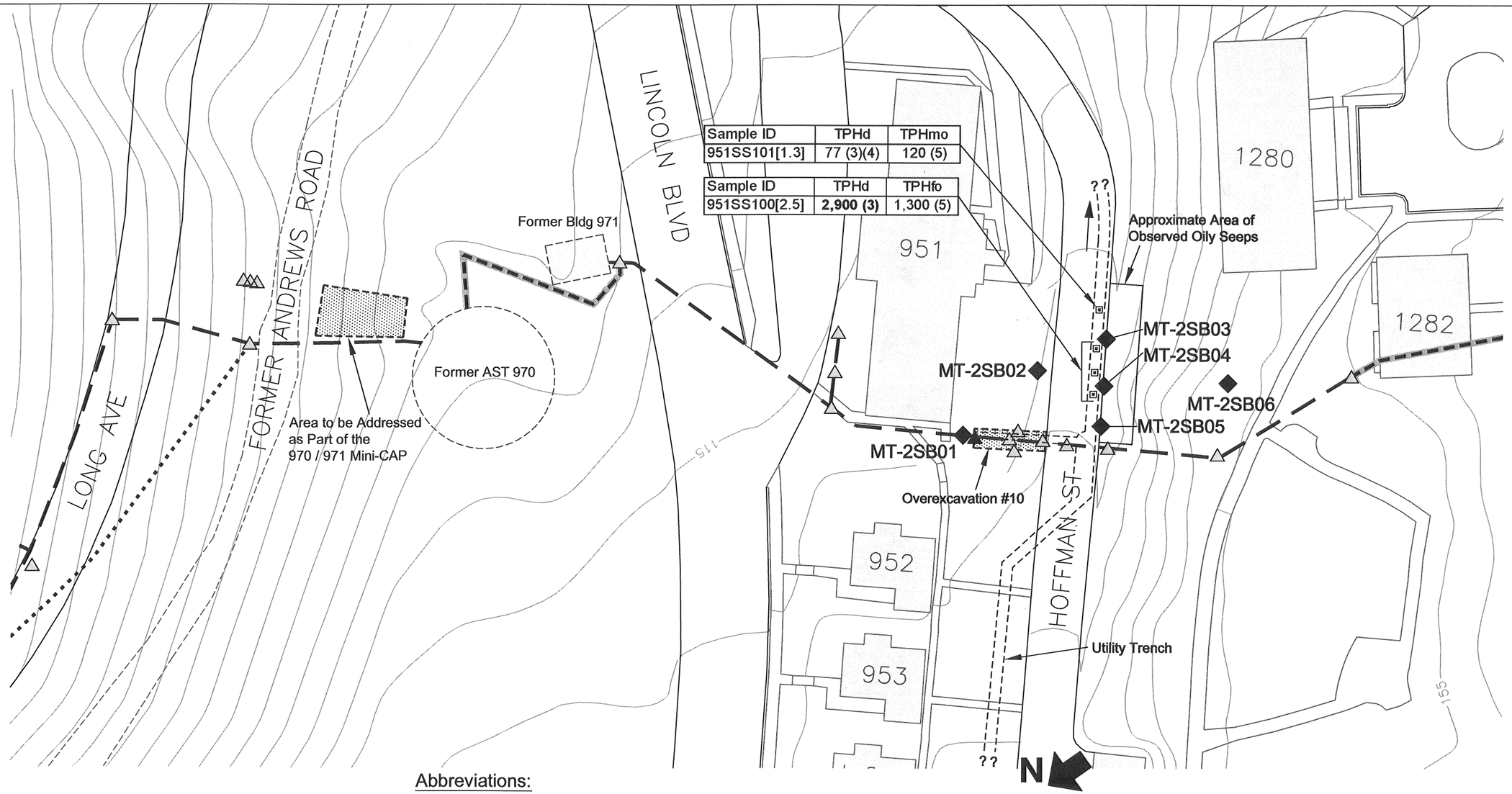
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
BR13 STATION 0+00 TO 8+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET BR13-1
FILE No.



Sample ID	TPHd	TPHmo
951SS101[1.3]	77 (3)(4)	120 (5)

Sample ID	TPHd	TPHfo
951SS100[2.5]	**2,900 (3)**	1,300 (5)

Legend:

- Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- Proposed Native Soil Sampling Location
- Presidio Trust Soil Sampling Location (2004)
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviations:

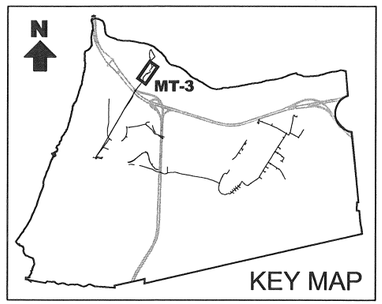
AST	Aboveground Storage Tank
CAP	Corrective Action Plan
FDS	Fuel Distribution System
TPHd	Total Petroleum Hydrocarbons as Diesel
TPHfo	Total Petroleum Hydrocarbons as Fuel Oil

Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.
3. Heavier hydrocarbons contributed to TPH quantitation.
4. Sample exhibits chromatographic pattern which does not resemble standard.
5. Lighter hydrocarbons contributed to TPHfo quantitation.
6. Reported chemical concentrations above soil cleanup levels are in **bold**.

0 50 100

(Approximate Scale in Feet)

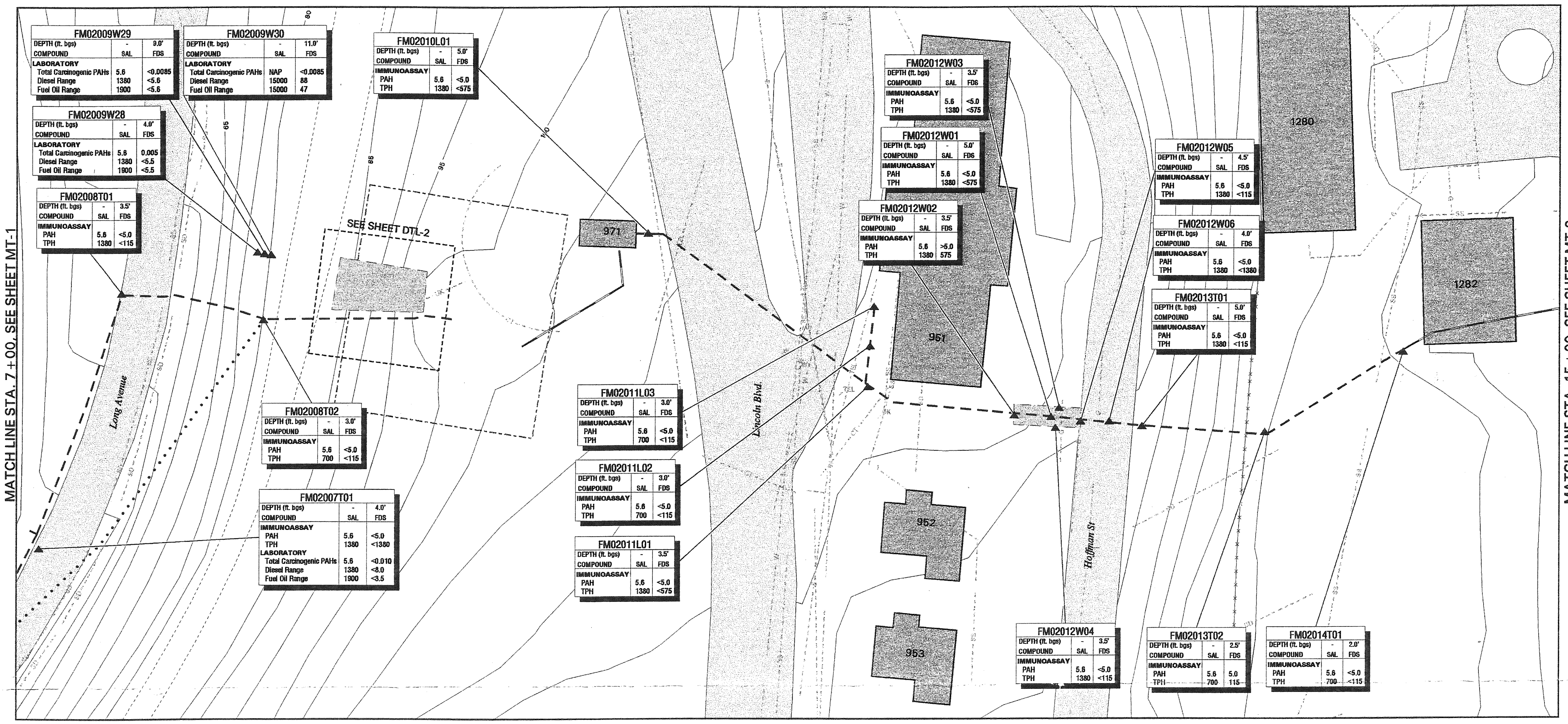


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-2

April 2007
EKI A70004.16
Figure 18

MATCH LINE STA. 7+00, SEE SHEET MT-1



MATCH LINE STA. 15+00, SEE SHEET MT-3

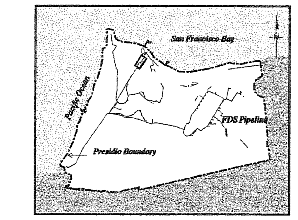
PLAN VIEW

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST031	POST041
Total Petroleum Hydrocarbons (mg/kg)	21	59
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	<0.17	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6
SPLP (µg/l)		
Diesel Range	<50	NA
Gasoline Range	<50	NA
Benzene	<0.5	NA
Ethylbenzene	<0.5	NA
Toluene	<0.5	NA
Xylenes (m&p-)	<0.5	NA
Xylenes (o-)	1.7	NA

RANGE 13 = Postpiles 101, 112, 113, 115
RANGE 14 = Postpiles 147-150

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST031	POST041
Total Petroleum Hydrocarbons (mg/kg)	21	59
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	<0.17	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6
SPLP (µg/l)		
Diesel Range	<50	NA
Gasoline Range	<50	NA
Benzene	<0.5	NA
Ethylbenzene	<0.5	NA
Toluene	<0.5	NA
Xylenes (m&p-)	<0.5	NA
Xylenes (o-)	1.7	NA

RANGE 13 = Postpiles 101, 112, 113, 115
RANGE 14 = Postpiles 147-150



FDS INDEX MAP (DRAWN AT 1' = 60,000')

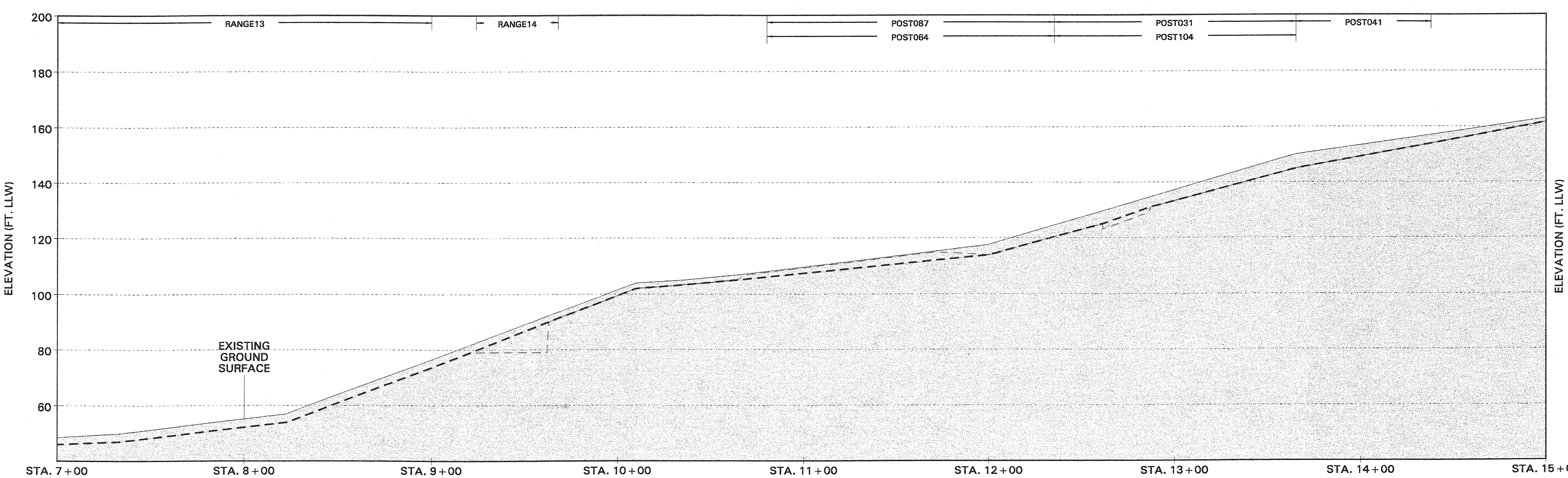
Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 20'

PROFILE

LTTD Soil Sample Analytical Results			
Analyte (unit of measure)	POST031	POST041	POST064
Total Petroleum Hydrocarbons (mg/kg)	21	59	22.1
BETX (mg/kg)			
Benzene	<0.006	<0.006	<0.006
Ethylbenzne	<0.006	<0.006	<0.006
Toluene	<0.006	<0.006	<0.006
Xylenes (total)	<0.006	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	<0.17	NA	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6	<5.6
SPLP (µg/l)			
Diesel Range	<50	NA	NA
Gasoline Range	<50	NA	NA
Benzene	<0.5	NA	NA
Ethylbenzene	<0.5	NA	NA
Toluene	<0.5	NA	NA
Xylenes (m&p-)	<0.5	NA	NA
Xylenes (o-)	1.7	NA	NA

RANGE 13 = Postpiles 101, 112, 113, 115
RANGE 14 = Postpiles 147-150

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-09	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

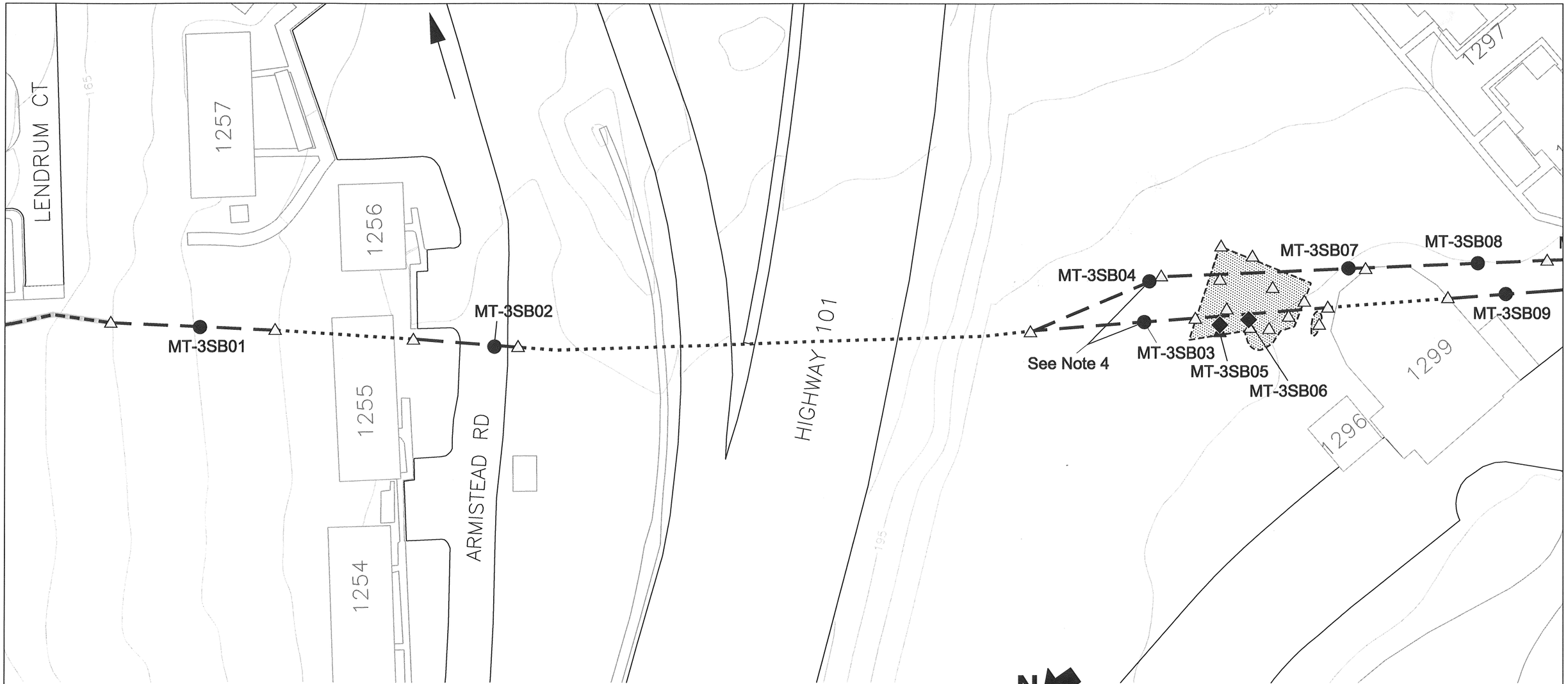
MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*
REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
STATION 7+00 TO 15+00

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.
SHEET MT-2 FILE No.



Legend:

- Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- Proposed Native Soil Sampling Location
- Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviation:

FDS	Fuel Distribution System

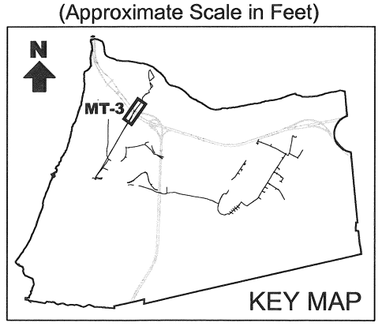
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.
3. The groundwater elevation information at this site is based on the measured groundwater elevation at monitoring well 1213GW101 (see Figure 20).
4. Do not collect sample if overburden consists of LTTD soil.

N

0 50 100

(Approximate Scale in Feet)

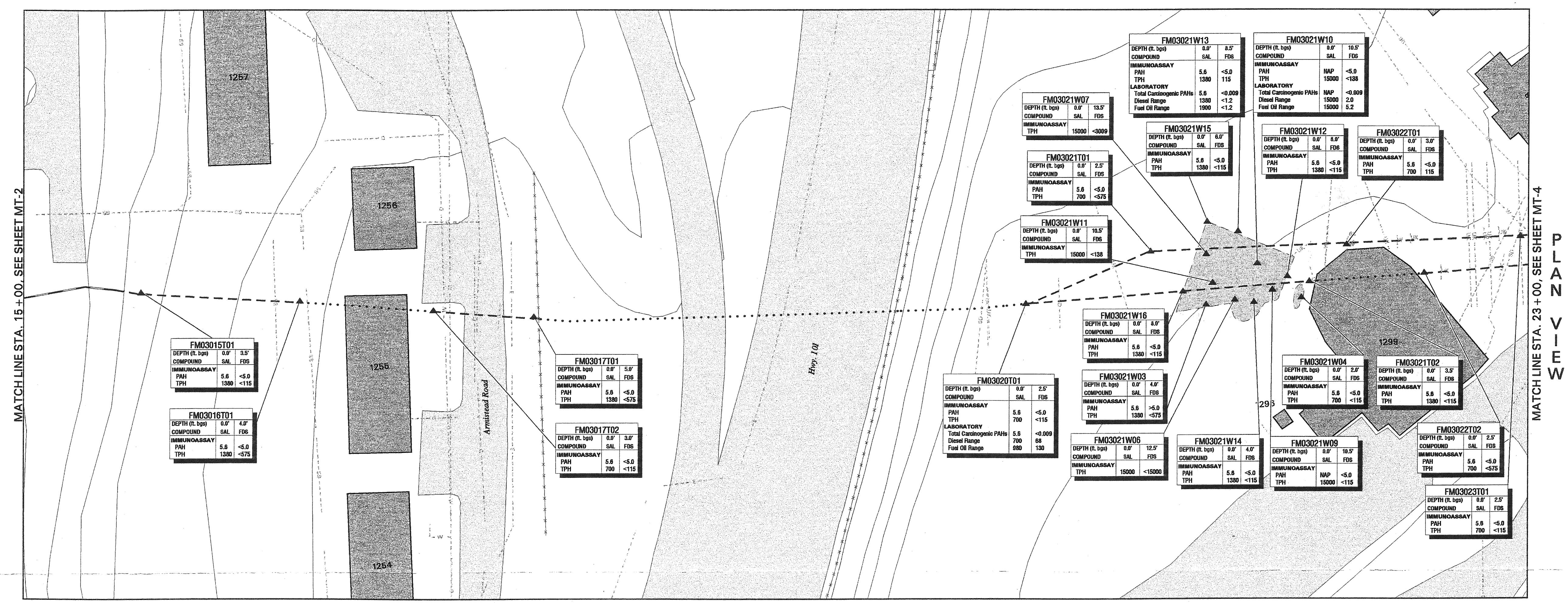


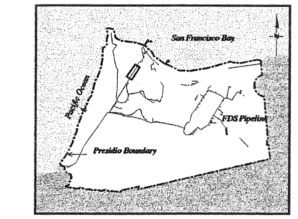
KEY MAP

Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-3

April 2007
EKI A70004.16
Figure 19





FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

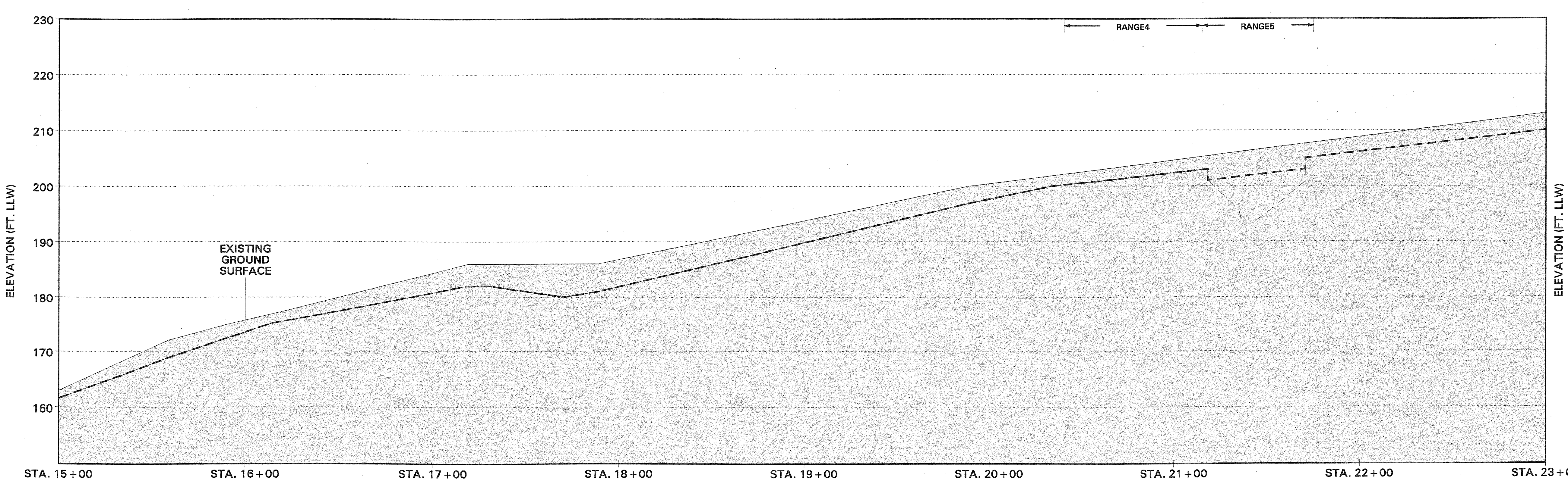
Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30 feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	RANGE4	RANGE5
Total Petroleum Hydrocarbons (mg/kg)	5 - 39	5 - 85
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	<0.027 - 0.87	<0.027 - 0.87
Immunoassay-PAHs (mg/kg)	<5.6	<5.6
SPLP (µg/l)		
Diesel Range	<50	<50
Gasoline Range	<50	<50
Benzene	<0.5	<0.5
Ethylbenzene	<0.5	<0.5
Toluene	<0.5	<0.5
Xylenes (m&p-)	<0.5	<0.5
Xylenes (o-)	<0.5	<0.5

RANGE4 = Postpiles 089 - 091, 093, 094
RANGE5 = Postpiles 079 - 081, 089 - 094



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

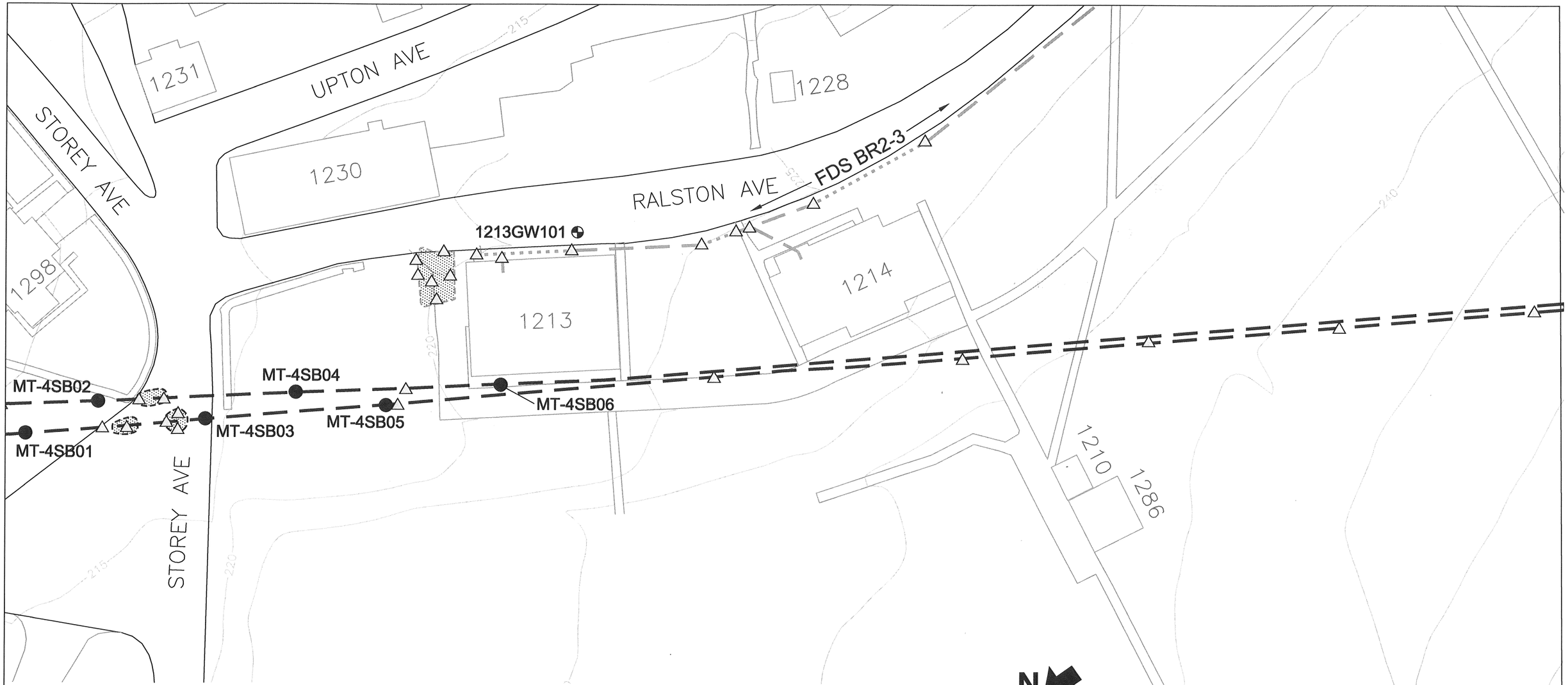
MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

PRESIDIO OF SAN FRANCISCO — CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT STATION 15+00 TO 23+00

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:
SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET MT-3
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- ◒ Groundwater Monitoring Well
- ▪▪▪▪▪▪▪ FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▒▒▒ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

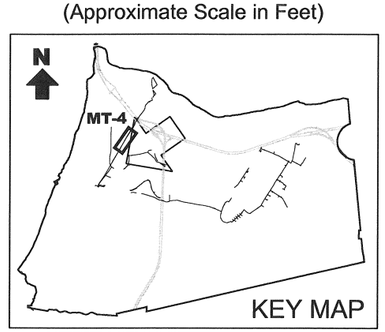
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.
3. Monitoring well location source: Semi-Annual Groundwater Monitoring Report, Third and Fourth Quarters 2005, Presidio-Wide Quarterly Groundwater Monitoring Program, Presidio of San Francisco, Ca, prepared by Treadwell & Rollo, Inc., April 2006.

N

0 50 100

(Approximate Scale in Feet)

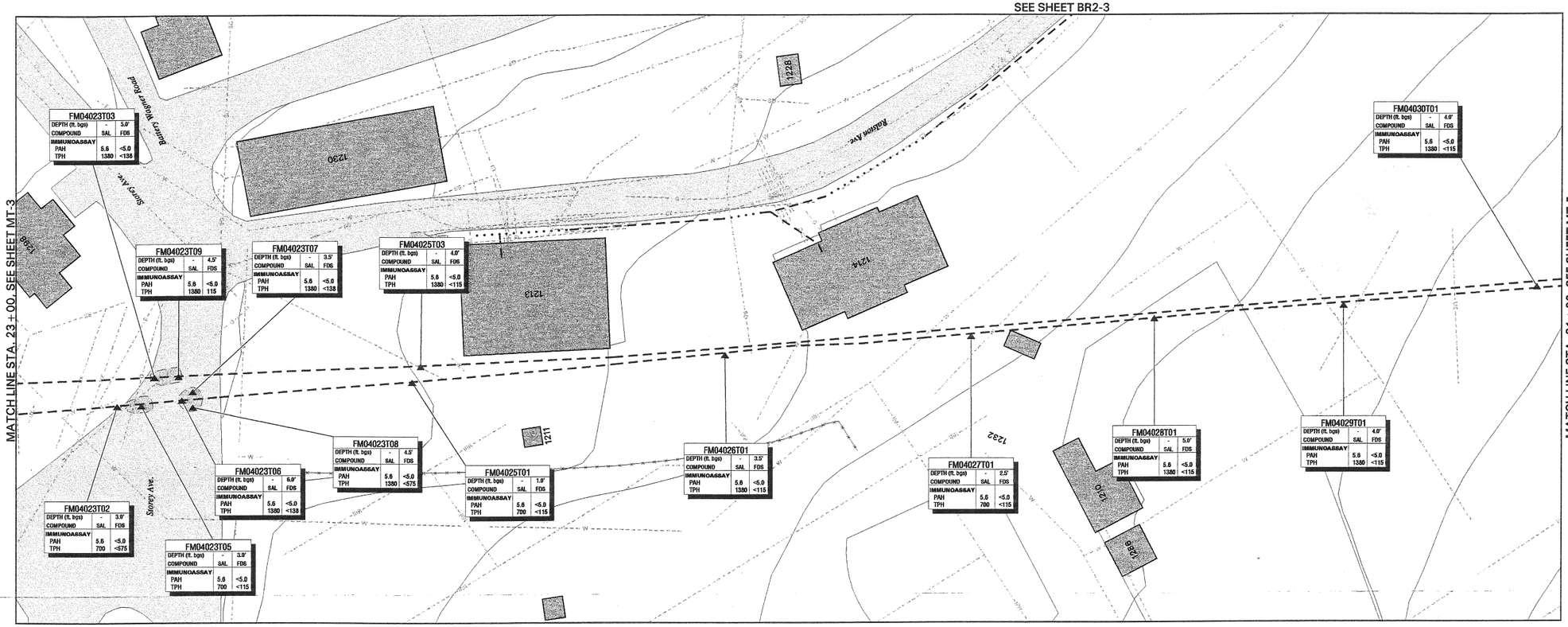


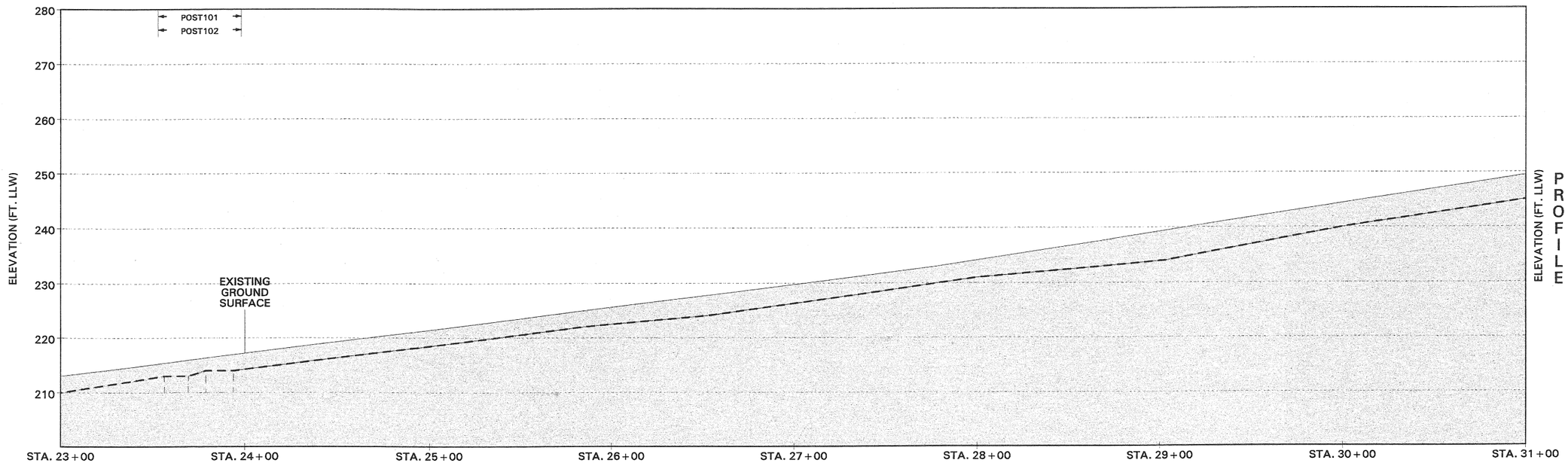
Erler & Kalinowski, Inc.

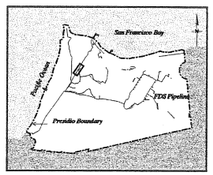
Proposed Sampling Locations
at Fuel Distribution System
Section MT-4

April 2007
EKI A70004.16
Figure 20

SEE SHEET BR2-3







FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line (Letter Designates Utility Type A Designates Abandoned)
	Pavement
1230	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1998)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST101	POST102
Total Petroleum Hydrocarbons (mg/kg)	59	34
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	0.64	1.35
Immunoassay-PAHs (mg/kg)	RS	RS
SPLP (µg/l)		
Diesel Range	NA	NA
Gasoline Range	NA	NA
Benzene	NA	NA
Ethylbenzene	NA	NA
Toluene	NA	NA
Xylenes (m&p-)	NA	NA
Xylenes (o-)	NA	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-OCT-00	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

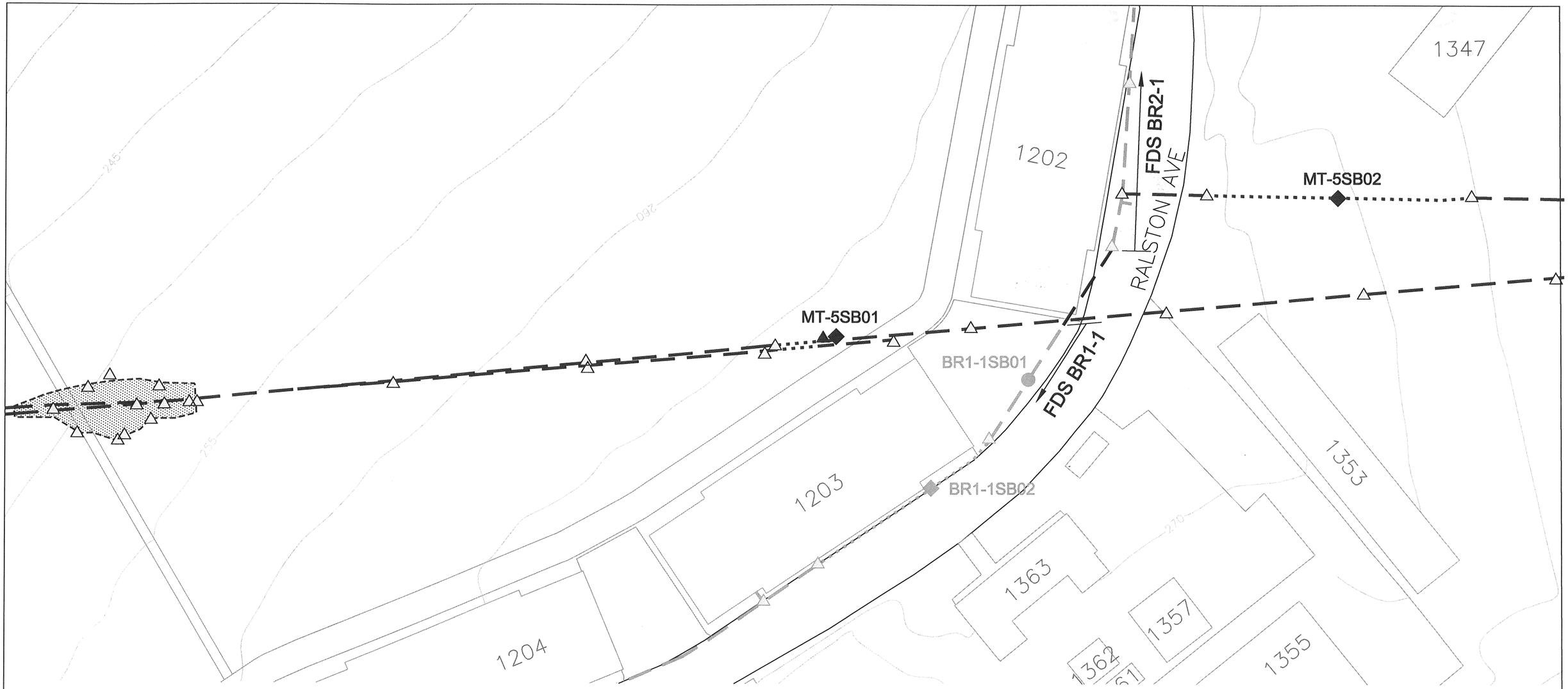
PRESIDIO OF SAN FRANCISCO CALIFORNIA

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT STATION 23+00 TO 31+00

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.

SHEET MT-4 FILE No.

fdremt04.gra fdremcore.and 04/09/01 18:39:32 Tue



Legend:

- Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- Proposed Native Soil Sampling Location
- Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

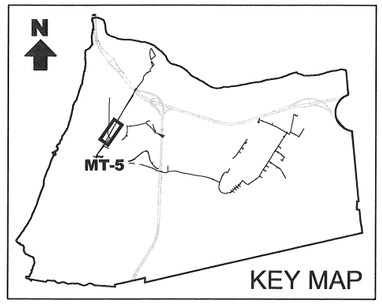
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

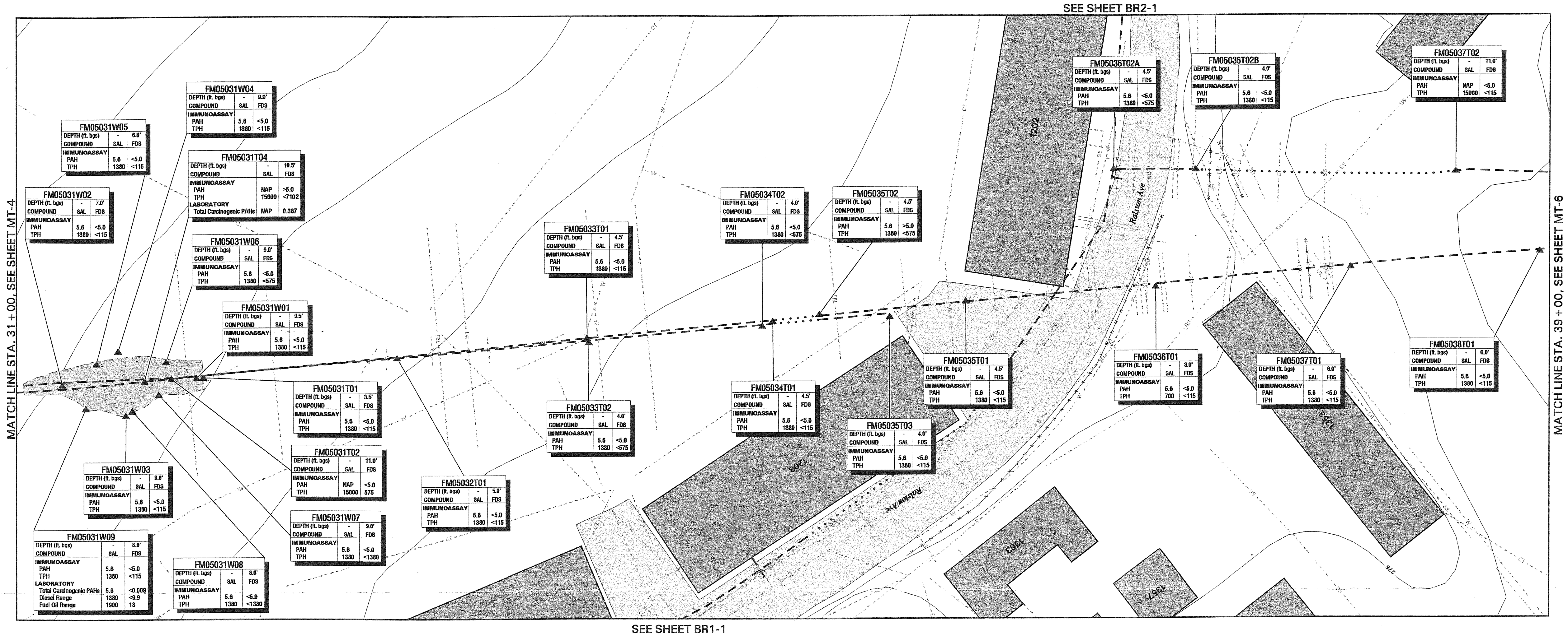
(Approximate Scale in Feet)

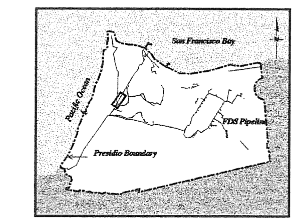


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-5

April 2007
EKI A70004.16
Figure 21





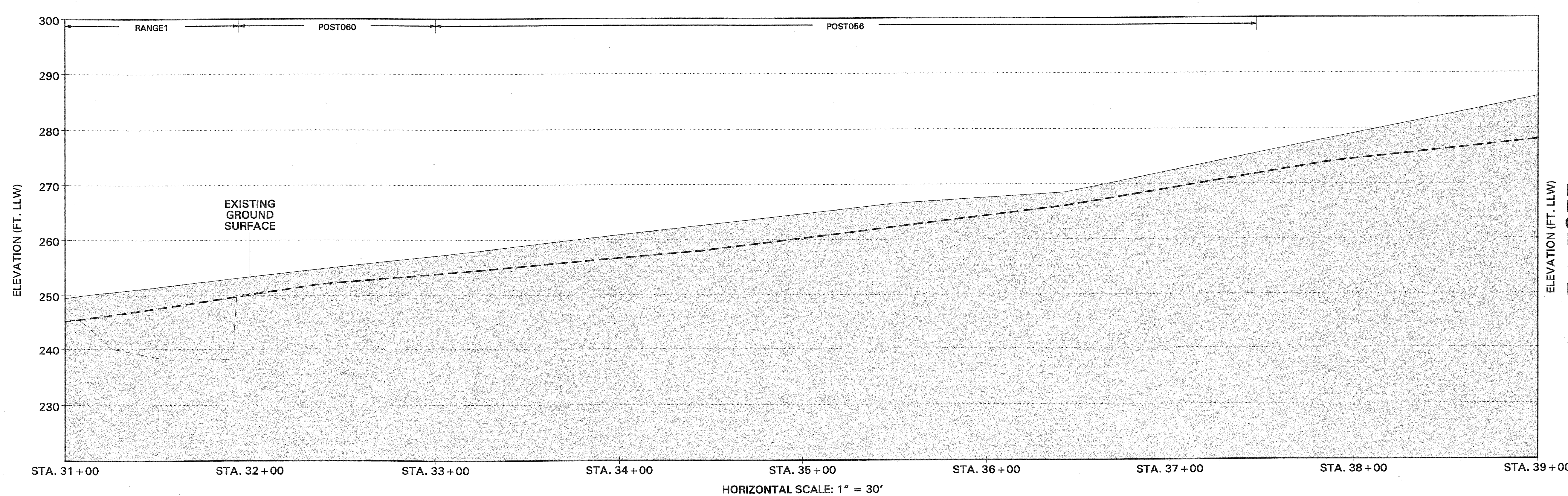
FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY ABANDONED PIPELINE.

0 15 30 feet

LTTD Soil Sample Analytical Results

Analyte (unit of measure)	POST056	POST060	RANGE1
Total Petroleum Hydrocarbons (mg/kg)	66	<3	<3 - 75
BETX (mg/kg)			
Benzene	<0.006	<0.006	<0.006
Ethylbenzne	<0.006	<0.006	<0.006
Toluene	<0.006	<0.006	<0.006
Xylenes (total)	<0.006	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	0.162	NA	0.162 - 0.93
Immunoassay-PAHs (mg/kg)	RS	<5.6	<5.6
SPLP (µg/l)			
Diesel Range	NA	NA	NA
Gasoline Range	NA	NA	NA
Benzene	NA	NA	NA
Ethylbenzene	NA	NA	NA
Toluene	NA	NA	NA
Xylenes (m&p-)	NA	NA	NA
Xylenes (o-)	NA	NA	NA

RANGE1 = Postpiles 056, 060, 088, 109, 110 - 117, 120

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

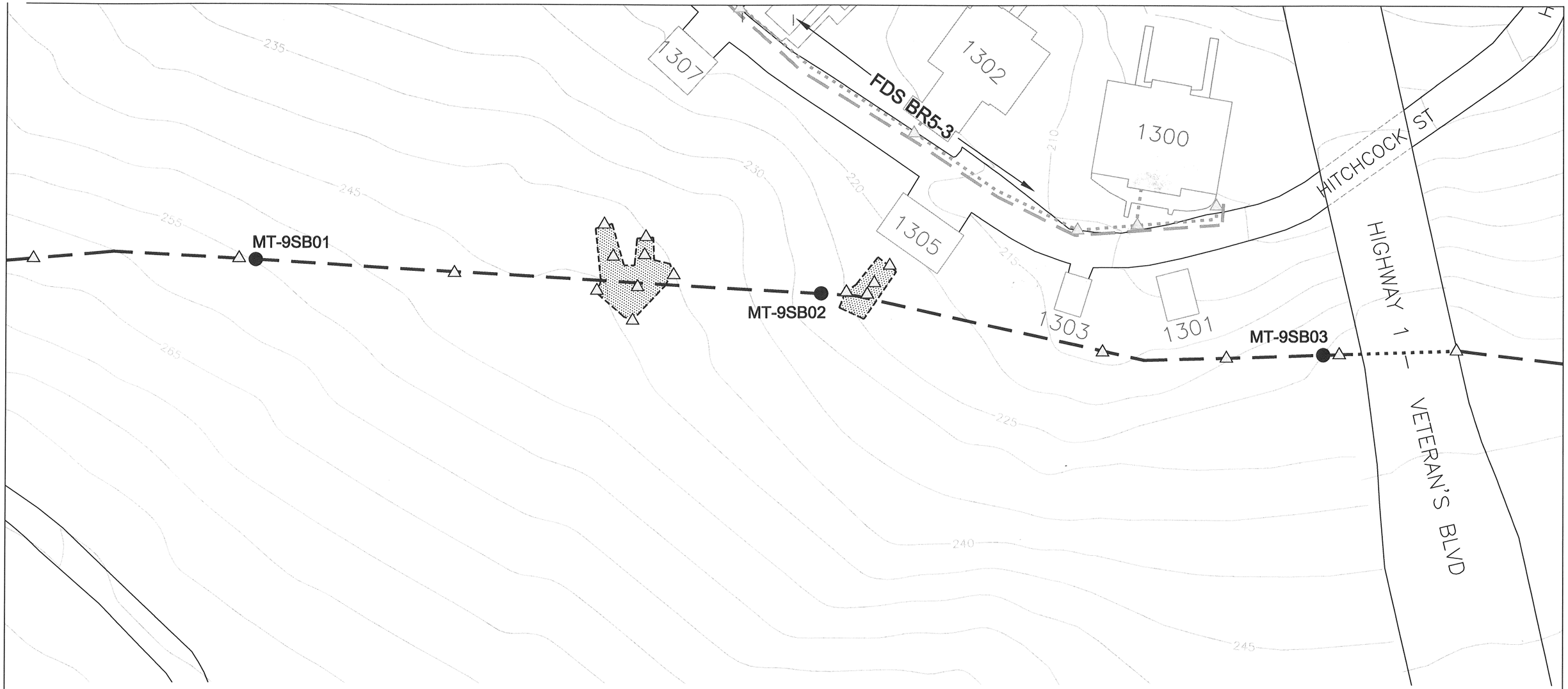
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
STATION 31+00 TO 39+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET MT-5
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- Historic Excavation Area

Abbreviation:

FDS	Fuel Distribution System

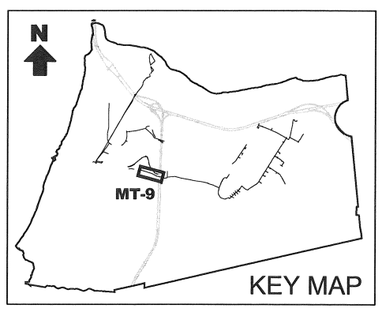
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

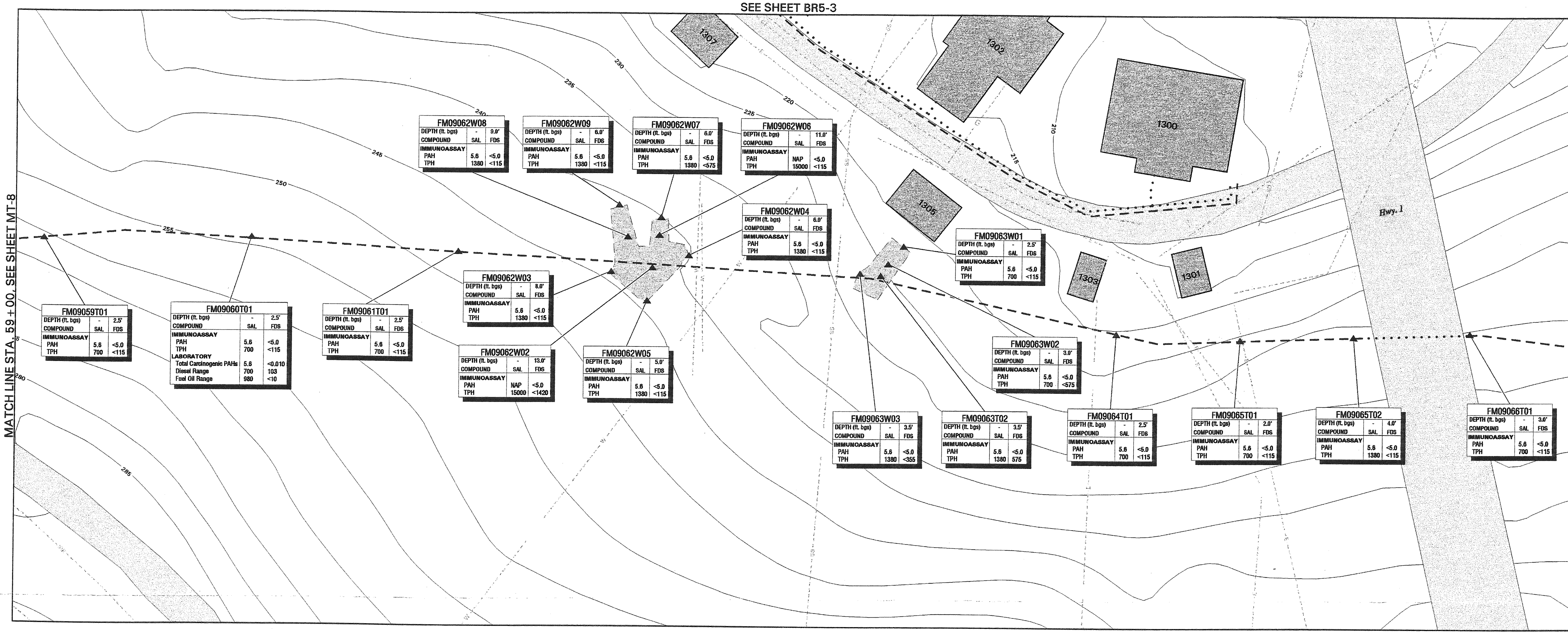
(Approximate Scale in Feet)

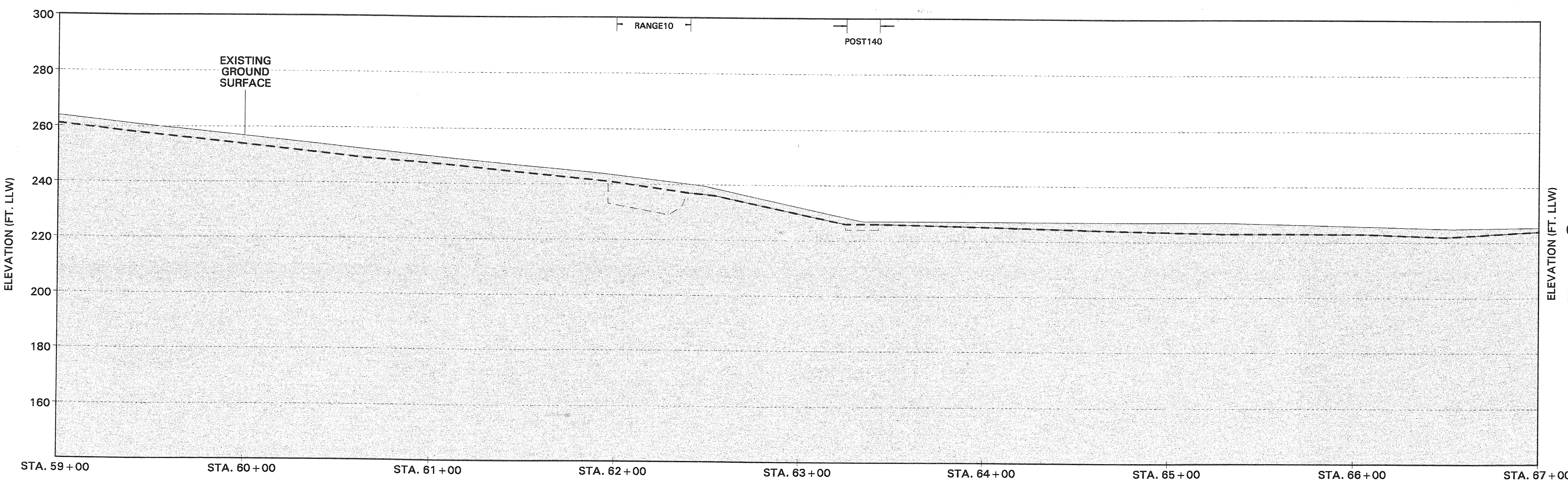


Erler & Kalinowski, Inc.

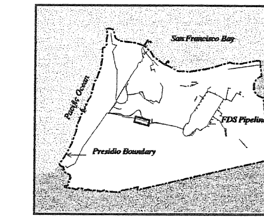
Proposed Sampling Locations
at Fuel Distribution System
Section MT-9

April 2007
EKI A70004.16
Figure 22





HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 20'



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30 feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST140	RANGE10
Total Petroleum Hydrocarbons (mg/kg)	41	15 - 100
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzene	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	NA	0.297 - 0.59
Immunoassay-PAHs (mg/kg)	<5.6	<5.6
SPLP (µg/l)		
Diesel Range	NA	<50
Gasoline Range	NA	<50
Benzene	NA	<0.5
Ethylbenzene	NA	<0.5
Toluene	NA	<0.5
Xylenes (m&p-)	NA	<0.5
Xylenes (o-)	NA	<0.5

RANGE 10 = Postpiles 119, 122, 123, 138-140

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT STATION 59+00 TO 67+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET MT-9
FILE No.

Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ▲ Army Confirmation Soil Sampling Location Above Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▒ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

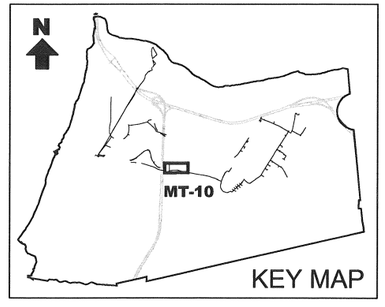
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

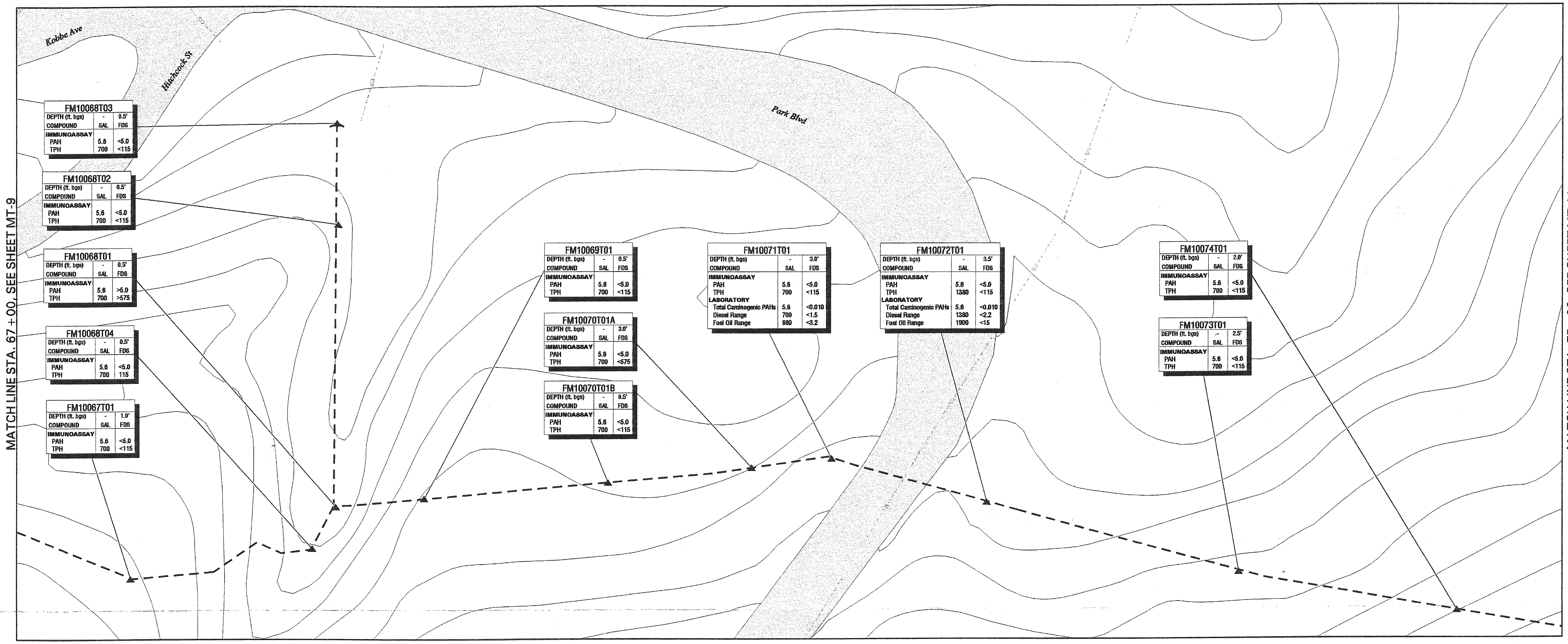
(Approximate Scale in Feet)

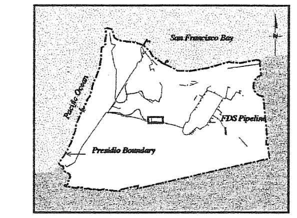


Erler & Kalinowski, Inc.

Proposed Sampling Locations at Fuel Distribution System Section MT-10

April 2007
EKI A70004.16
Figure 23


Kobbe Ave
Hitchcock St
Park Blvd
MATCH LINE STA. 67+00, SEE SHEET MT-9
MATCH LINE STA. 75+00, SEE SHEET MT-11
PLAN VIEW
FM10068T03
DEPTH (ft. bgs) | - | 0.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
FM10068T02
DEPTH (ft. bgs) | - | 0.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
FM10068T01
DEPTH (ft. bgs) | - | 0.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | >5.0
TPH | 700 | >575
FM10068T04
DEPTH (ft. bgs) | - | 0.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | 115
FM10067T01
DEPTH (ft. bgs) | - | 1.0'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
FM10069T01
DEPTH (ft. bgs) | - | 0.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
FM10070T01A
DEPTH (ft. bgs) | - | 3.0'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <575
FM10070T01B
DEPTH (ft. bgs) | - | 0.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
FM10071T01
DEPTH (ft. bgs) | - | 3.0'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
LABORATORY
Total Carcinogenic PAHs | 5.6 | <0.010
Diesel Range | 700 | <1.5
Fuel Oil Range | 980 | <3.2
FM10072T01
DEPTH (ft. bgs) | - | 3.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 1380 | <115
LABORATORY
Total Carcinogenic PAHs | 5.6 | <0.010
Diesel Range | 1380 | <2.2
Fuel Oil Range | 1900 | <15
FM10074T01
DEPTH (ft. bgs) | - | 2.0'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115
FM10073T01
DEPTH (ft. bgs) | - | 2.5'
COMPOUND | SAL | FDS
IMMUNOASSAY
PAH | 5.6 | <5.0
TPH | 700 | <115



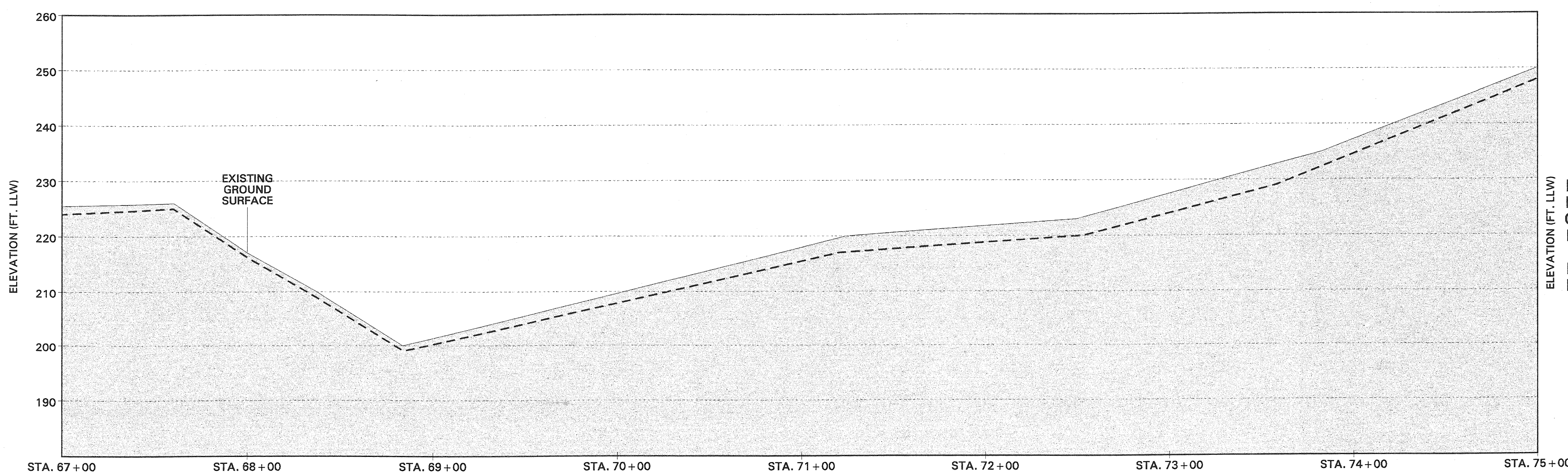
FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

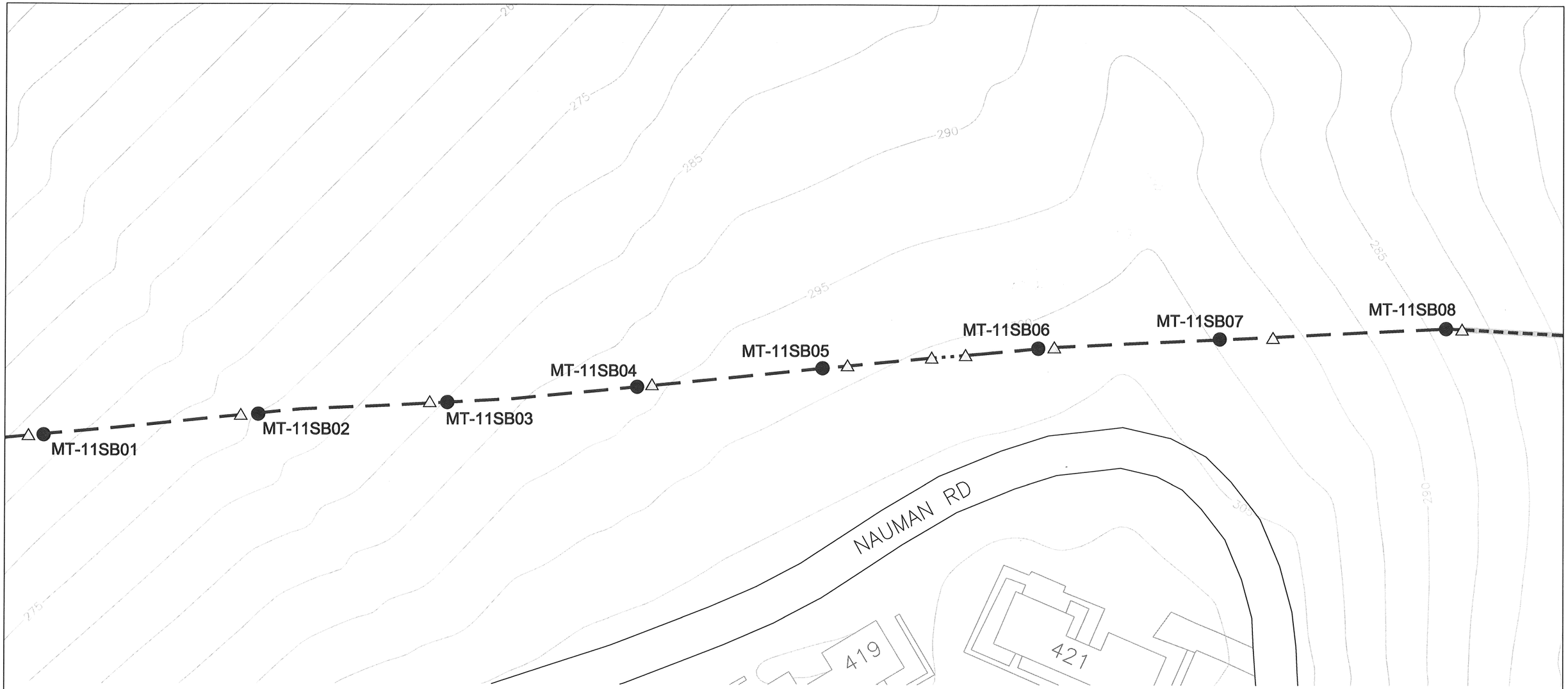
DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT STATION 67+00 TO 75+00

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.

SHEET MT-10 FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)

Abbreviation:

FDS Fuel Distribution System

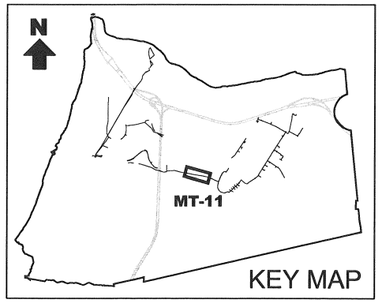
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

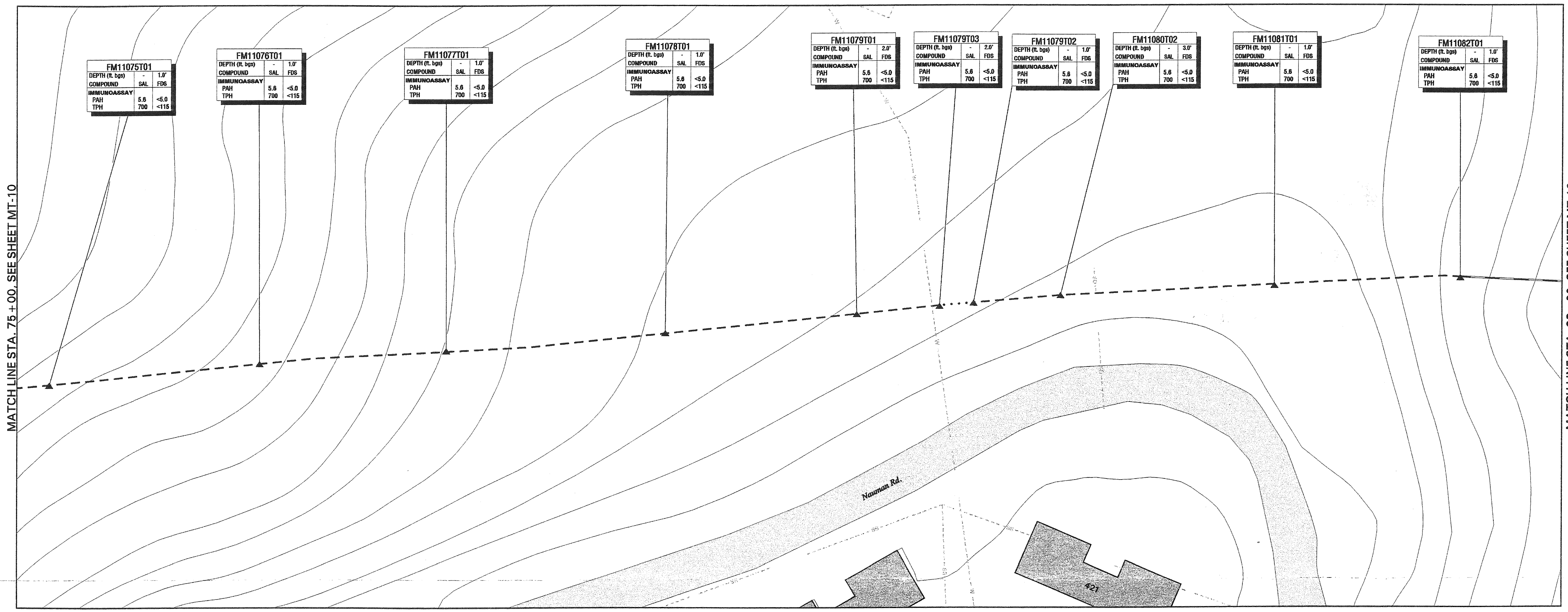
(Approximate Scale in Feet)



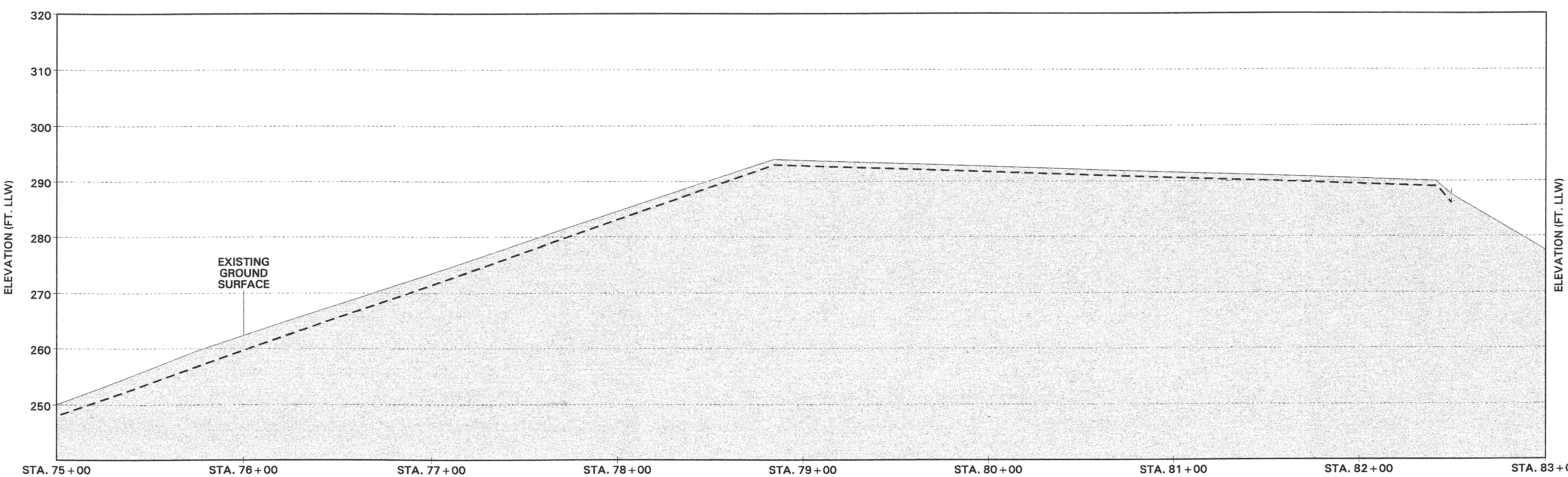
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-11

April 2007
EKI A70004.16
Figure 24



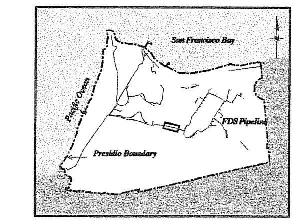
PLAN VIEW



PROFILE

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

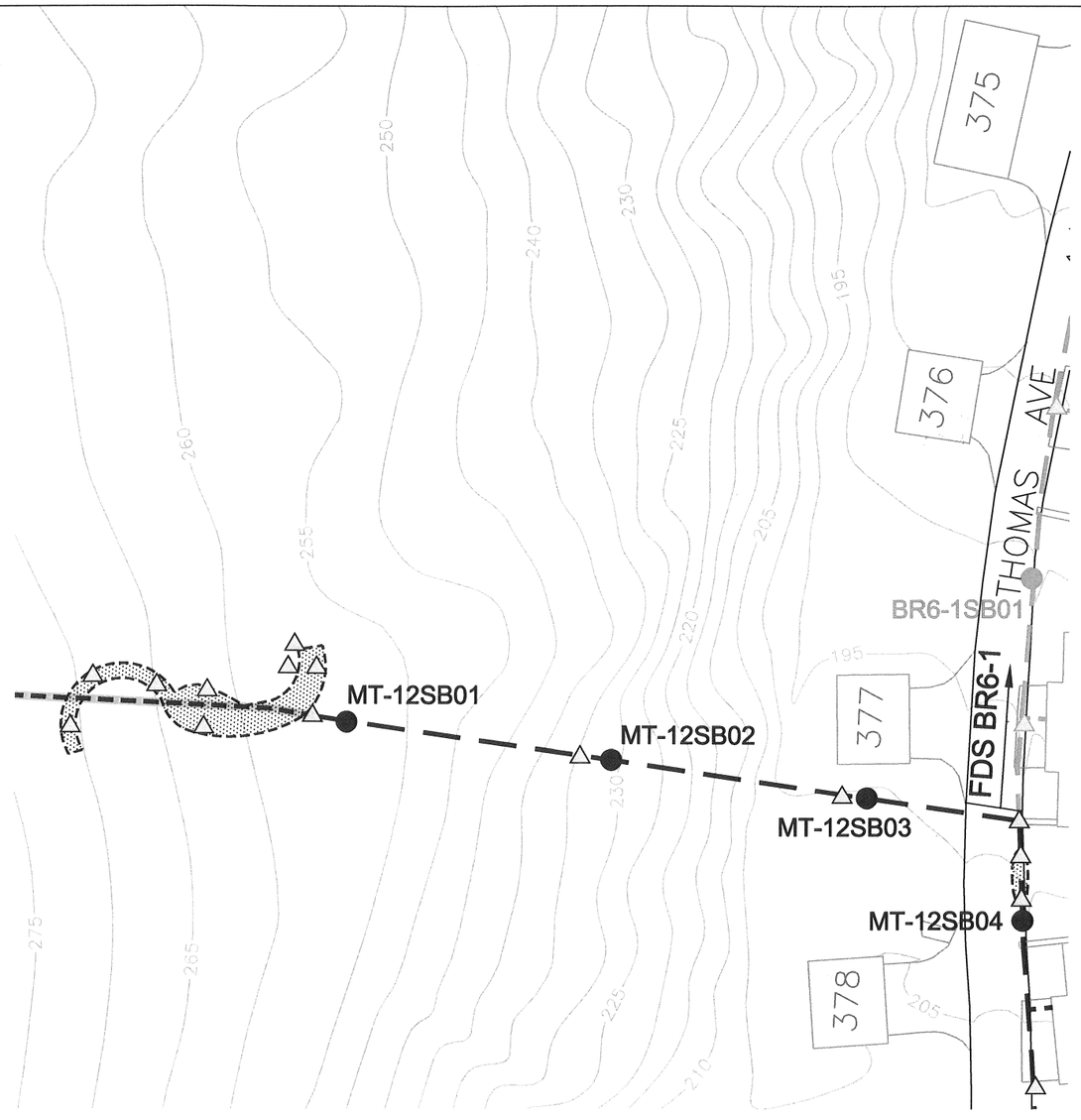
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
STATION 75+00 TO 83+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET MT-11
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

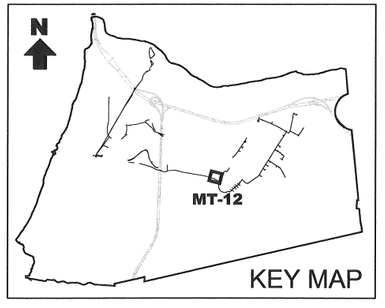
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

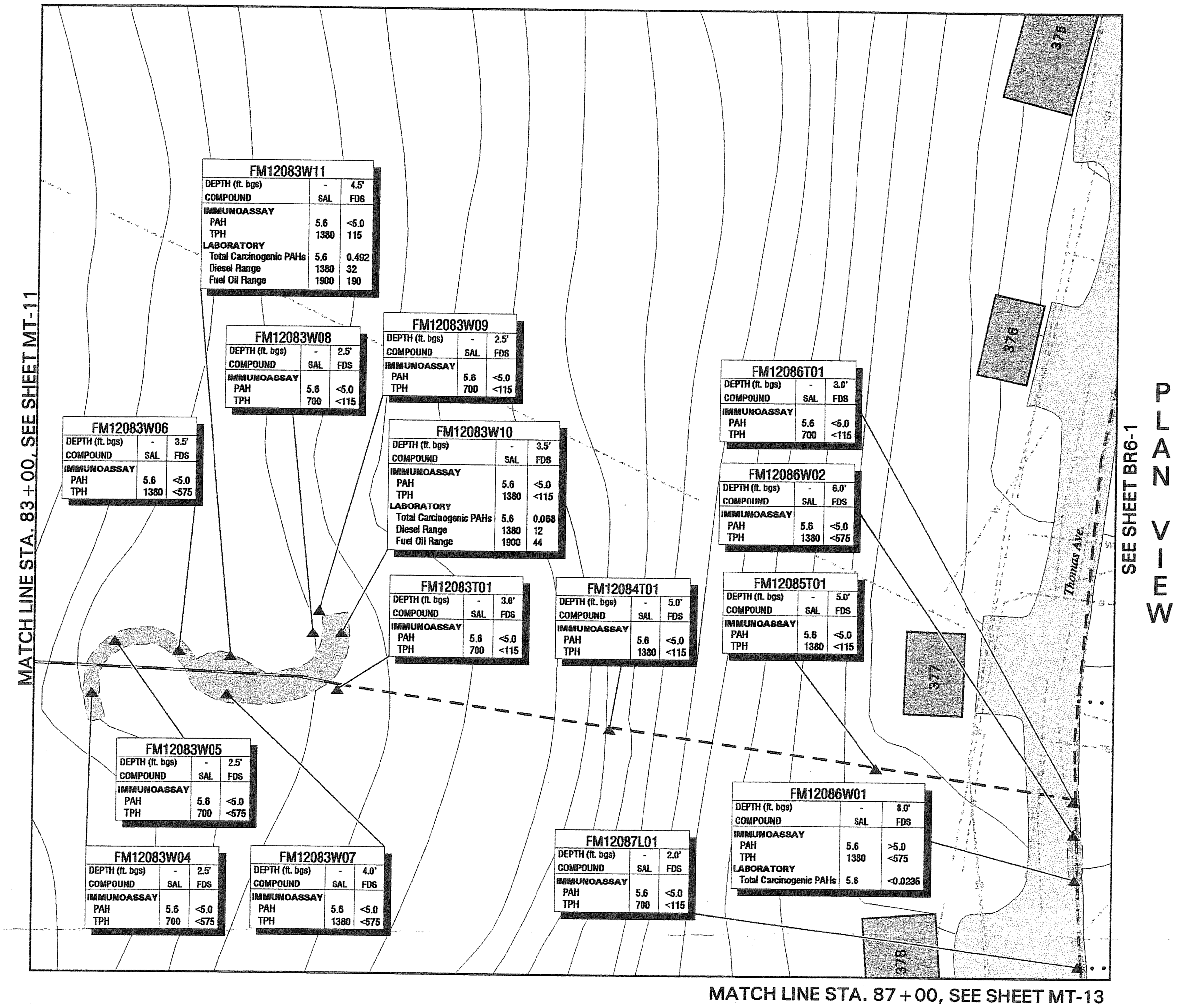
(Approximate Scale in Feet)



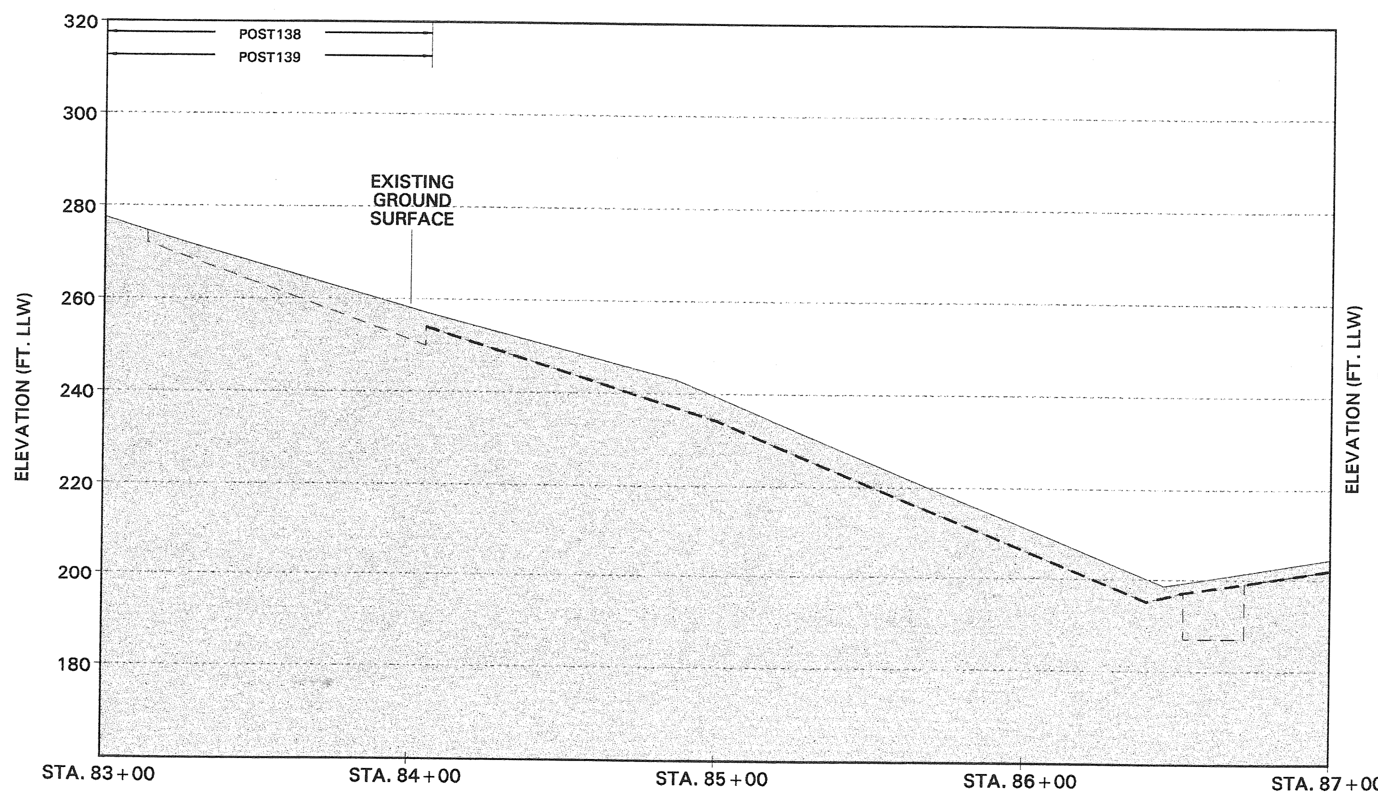
Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-12

April 2007
EKI A70004.16
Figure 25



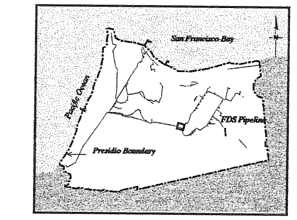
PLAN VIEW



PROFILE

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 20'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.



FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30 feet

LTTD Soil Sample Analytical Results		
Analyte (unit of measure)	POST138	POST139
Total Petroleum Hydrocarbons (mg/kg)	59	100
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	0.59	NA
Immunoassay-PAHs (mg/kg)	RS	<5.6
SPLP (μg/l)		
Diesel Range	NA	NA
Gasoline Range	NA	NA
Benzene	NA	NA
Ethylbenzene	NA	NA
Toluene	NA	NA
Xylenes (m&p-)	NA	NA
Xylenes (o-)	NA	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

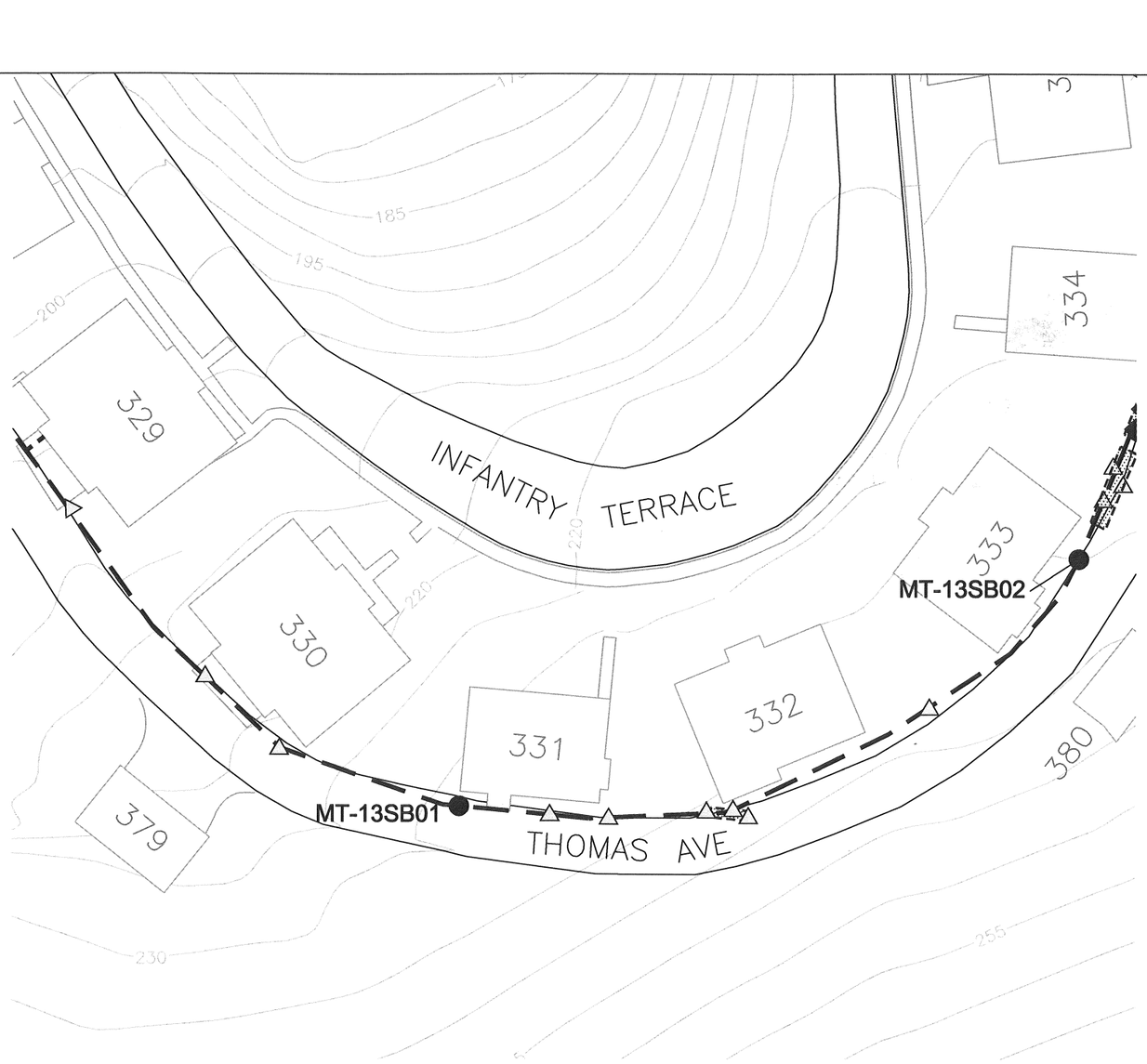
MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO CALIFORNIA
REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
STATION 83+00 TO 87+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET MT-12
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▒ Historic Excavation Area

Abbreviation:

FDS	Fuel Distribution System

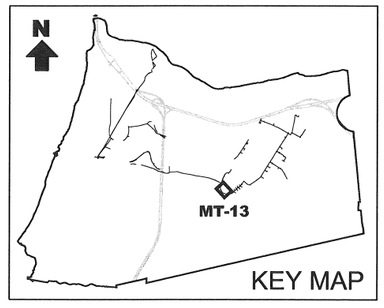
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

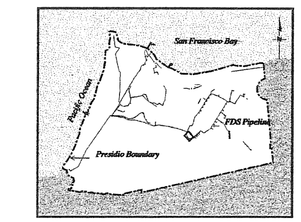
(Approximate Scale in Feet)



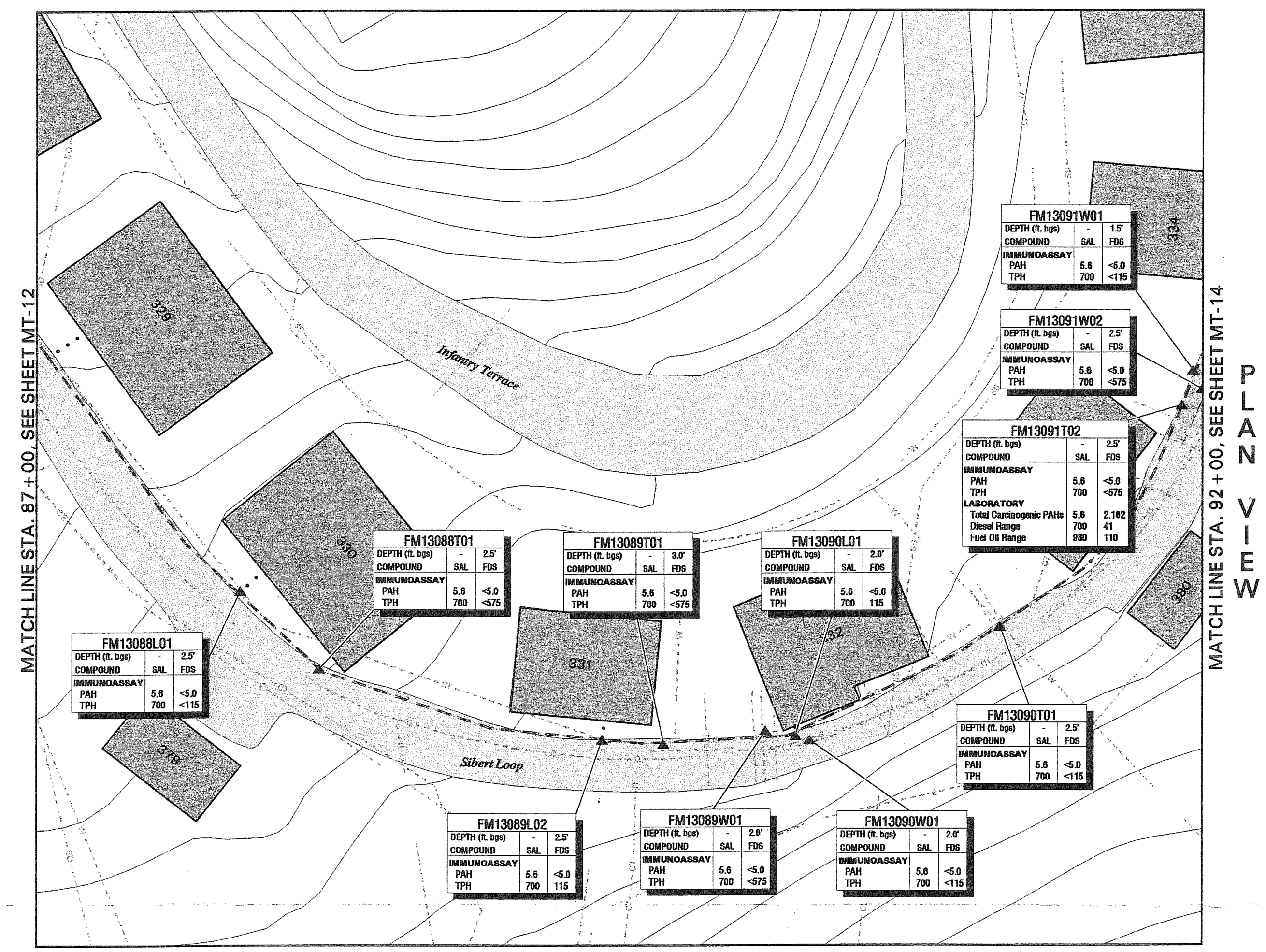
Erler & Kalinowski, Inc.

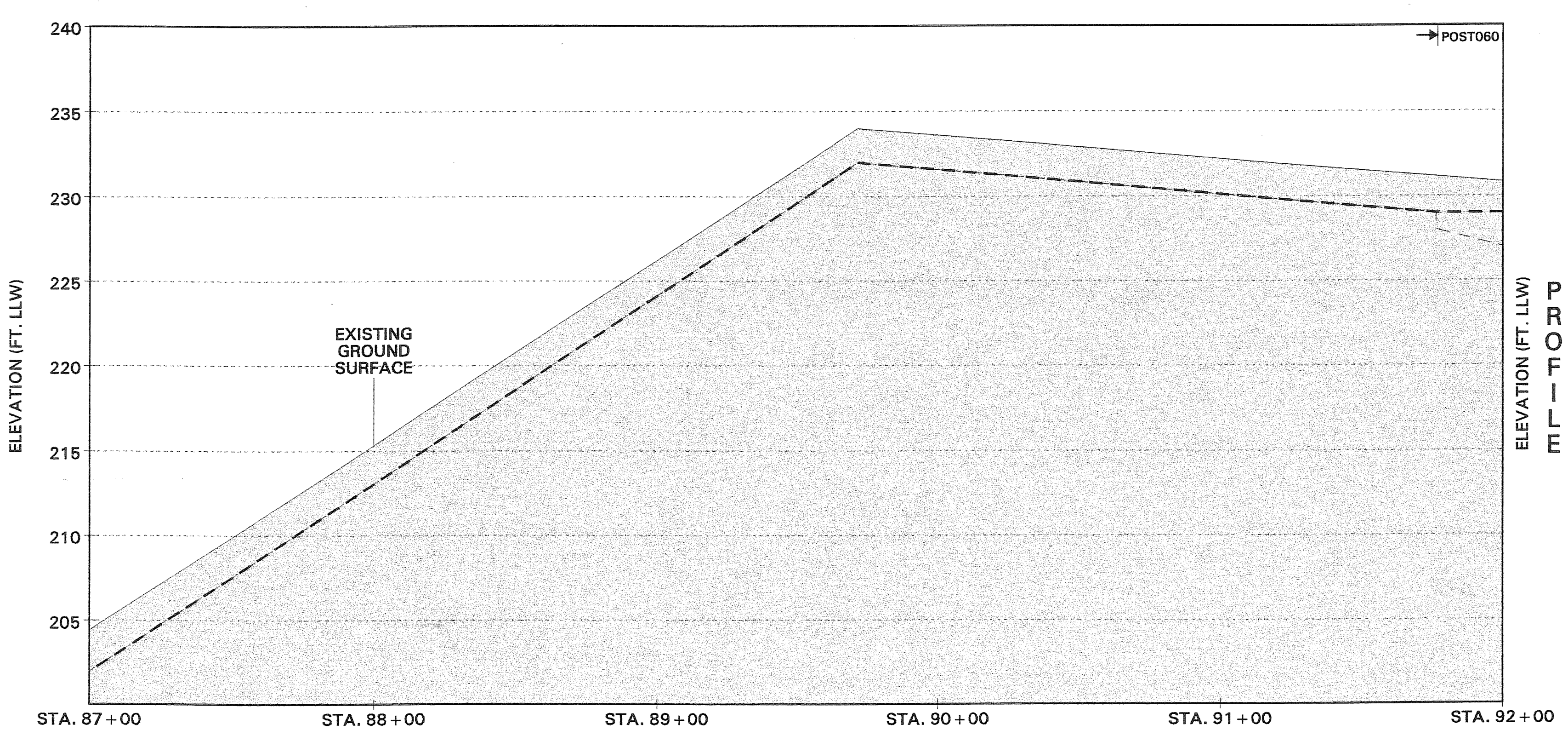
Proposed Sampling Locations
at Fuel Distribution System
Section MT-13

April 2007
EKI A70004.16
Figure 26



FDS INDEX MAP (DRAWN AT 1' = 60,000')





HORIZONTAL SCALE: 1" = 30'

VERTICAL SCALE: 1" = 5'

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	POST060
Total Petroleum Hydrocarbons (mg/kg)	<3
BETX (mg/kg)	
Benzene	<0.006
Ethylbenzne	<0.006
Toluene	<0.006
Xylenes (total)	<0.006
Total Carcinogenic PAHs (mg/kg)	NA
Immunoassay-PAHs (mg/kg)	<5.6
SPLP (µg/l)	
Diesel Range	NA
Gasoline Range	NA
Benzene	NA
Ethylbenzene	NA
Toluene	NA
Xylenes (m&p-)	NA
Xylenes (o-)	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF

DRAWN: I. KENNEDY

CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT STATION 87+00 TO 92+00

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.

SHEET MT-13 FILE No.

Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ● Proposed Overburden Soil Sampling Location
- ····· FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)
- ▨ Historic Excavation Area

Abbreviation:

FDS Fuel Distribution System

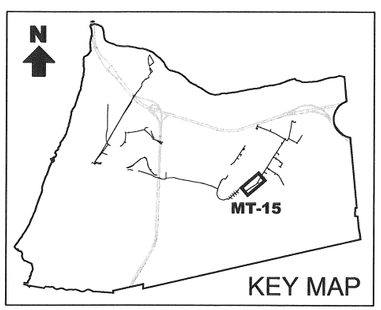
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

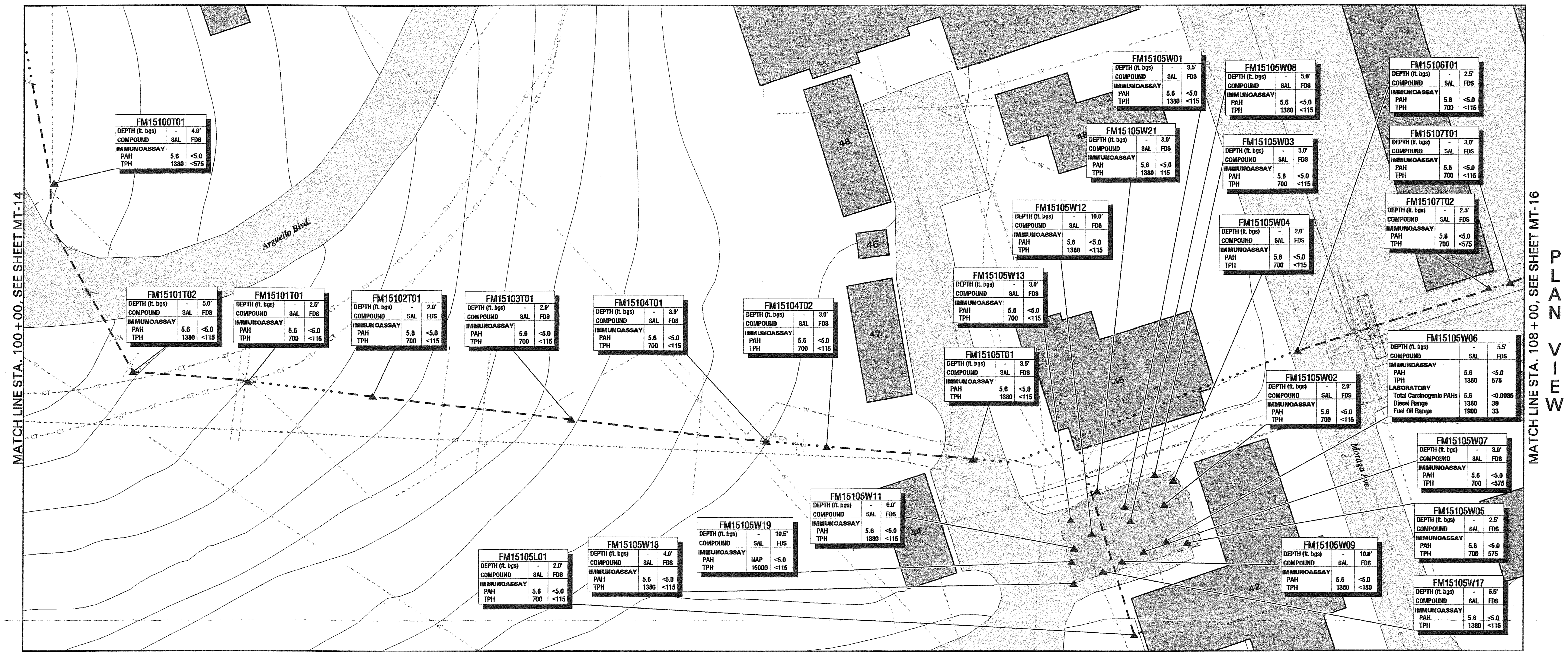
(Approximate Scale in Feet)

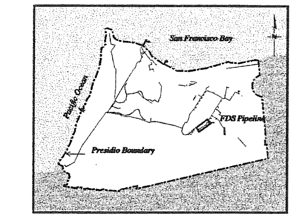


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-15

April 2007
EKI A70004.16
Figure 27





FDS INDEX MAP (DRAWN AT 1' = 60,000')

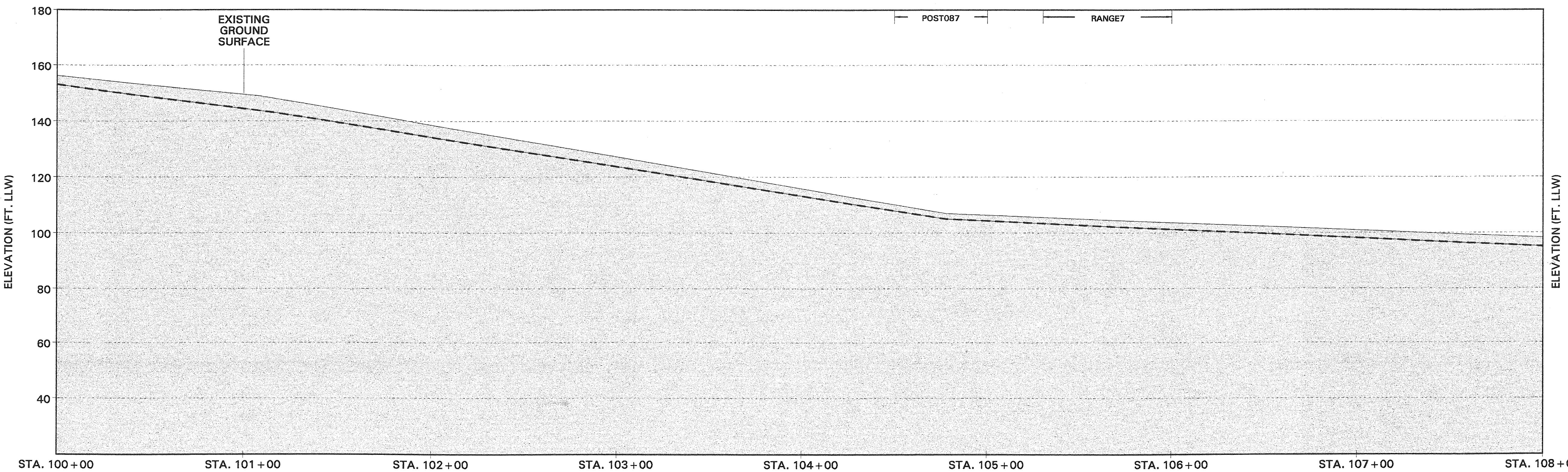
Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 20'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.

LTTD Soil Sample Analytical Results

Analyte (unit of measure)	POST087	RANGE7
Total Petroleum Hydrocarbons (mg/kg)	38	22 - 95
BETX (mg/kg)		
Benzene	<0.006	<0.006
Ethylbenzne	<0.006	<0.006
Toluene	<0.006	<0.006
Xylenes (total)	<0.006	<0.006
Total Carcinogenic PAHs (mg/kg)	NA	<0.027 - 3.18
Immunoassay-PAHs (mg/kg)	<5.6	<5.6 - >5.6
SPLP (μg/l)		
Diesel Range	NA	<50
Gasoline Range	NA	<50
Benzene	NA	<0.5
Ethylbenzene	NA	<0.5
Toluene	NA	<0.5
Xylenes (m&p-)	NA	<0.5
Xylenes (o-)	NA	<0.5

RANGE7 = Postpiles 087, 093 - 097, 101, 103

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

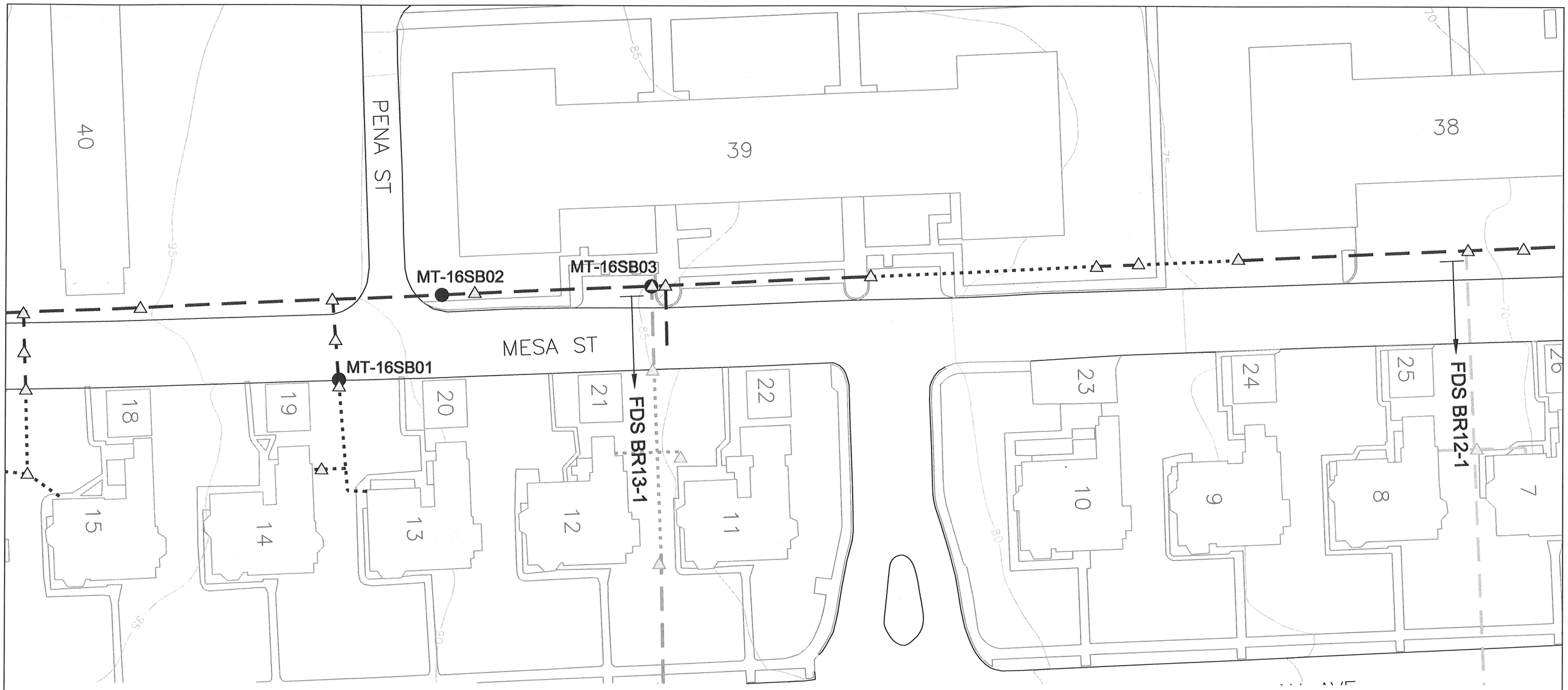
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO — *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE AS-BUILT
STATION 100+00 TO 108+00

SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET MT-15
FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ● Proposed Overburden Soil Sampling Location
- ------- FDS Pipeline (Abandoned in Place)
- — — FDS Pipeline (Previously Removed by Army from 1996-1999)

Abbreviation:

FDS	Fuel Distribution System

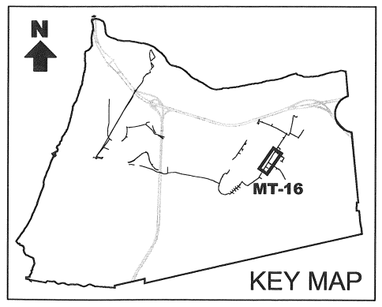
Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

N

0 50 100

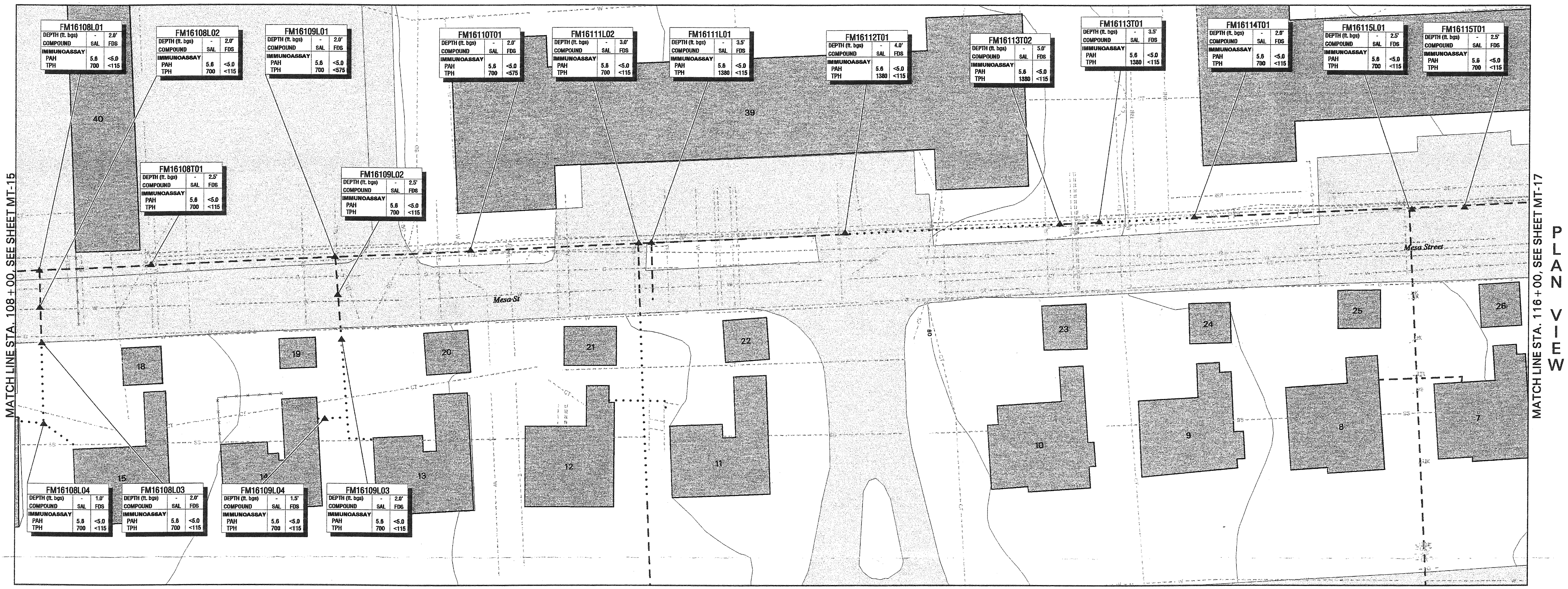
(Approximate Scale in Feet)



Erler & Kalinowski, Inc.

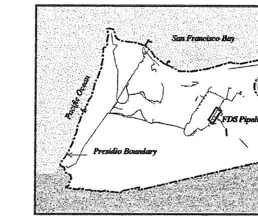
Proposed Sampling Locations at Fuel Distribution System Section MT-16

April 2007
EKI A70004.16
Figure 28



FM16108L01 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16108L02 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16109L01 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <575
FM16110T01 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <575
FM16111L02 DEPTH (ft. bgs) - 3.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16111L01 DEPTH (ft. bgs) - 3.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 1380 <115
FM16112T01 DEPTH (ft. bgs) - 4.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 1380 <115
FM16113T02 DEPTH (ft. bgs) - 5.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 1380 <115
FM16113T01 DEPTH (ft. bgs) - 3.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 1380 <115
FM16114T01 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16115L01 DEPTH (ft. bgs) - 2.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16115T01 DEPTH (ft. bgs) - 2.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16108T01 DEPTH (ft. bgs) - 2.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16109L02 DEPTH (ft. bgs) - 2.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16108L04 DEPTH (ft. bgs) - 1.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16108L03 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16109L04 DEPTH (ft. bgs) - 1.5' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
FM16109L03 DEPTH (ft. bgs) - 2.0' COMPOUND SAL FDS IMMUNOASSAY PAH 5.6 <5.0 TPH 700 <115
Mesa St
Mesa Street
MATCH LINE STA. 108+00, SEE SHEET MT-15
MATCH LINE STA. 116+00, SEE SHEET MT-17

PLAN VIEW



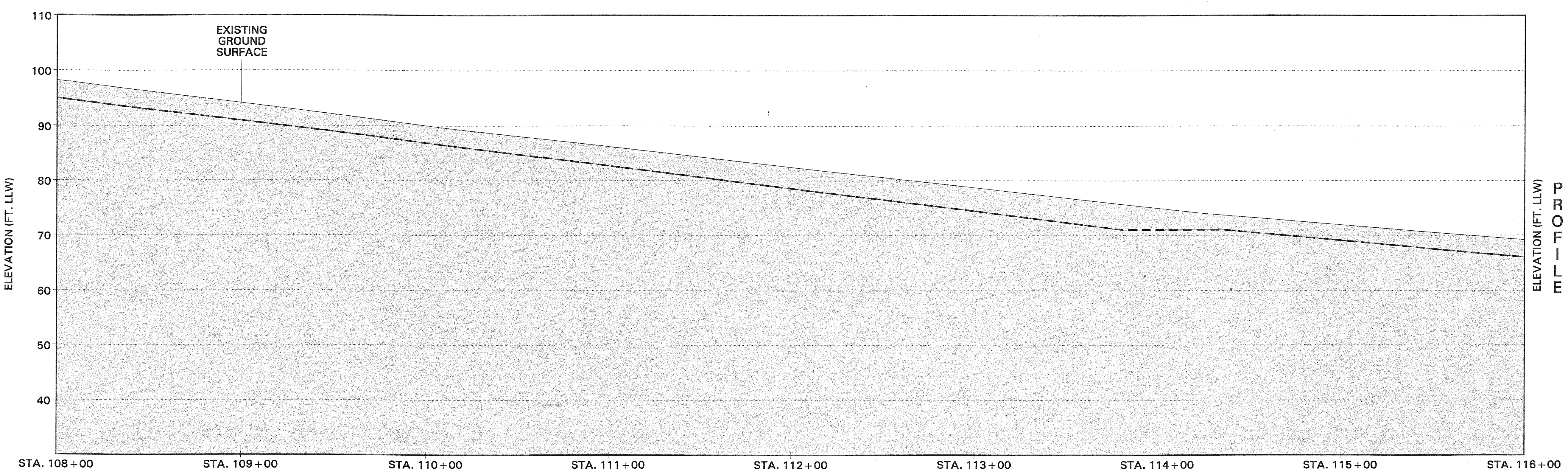
FDS INDEX MAP (DRAWN AT 1' = 60,000')

Legend:

E	Electric Line
G	Gas Line
IRR	Irrigation Line
SD	Storm Drain Line
SS	Sanitary Sewer Line
T	Telephone Line
W	Water Line
CT	Cable TV Line
FO	Fiber Optic Line
SL	Street Light Line
U	Unknown Line
XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
	Building and Identification No.
	Excavation
	Limit of Excavation
	Removed FDS Pipeline
	Abandoned In Place FDS Pipeline
	Previously Removed FDS Pipeline
	Topographic Contour (Contour Interval: 5ft.)
	Fence
	Removed Structure (except tanks)
▲	Soil Sample
FB0112T02	Soil Sample Identification No.
POST018	LTTD Soil Sample Identification No.
NA	Not Analyzed
NAP	Not Applicable
SAL	Soil Action Level Established in SCRs (RWQCB, 1996)
RS	Immunoassay Result Superseded by Laboratory PAH Analysis

Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)



PROFILE

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

0 15 30 feet

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

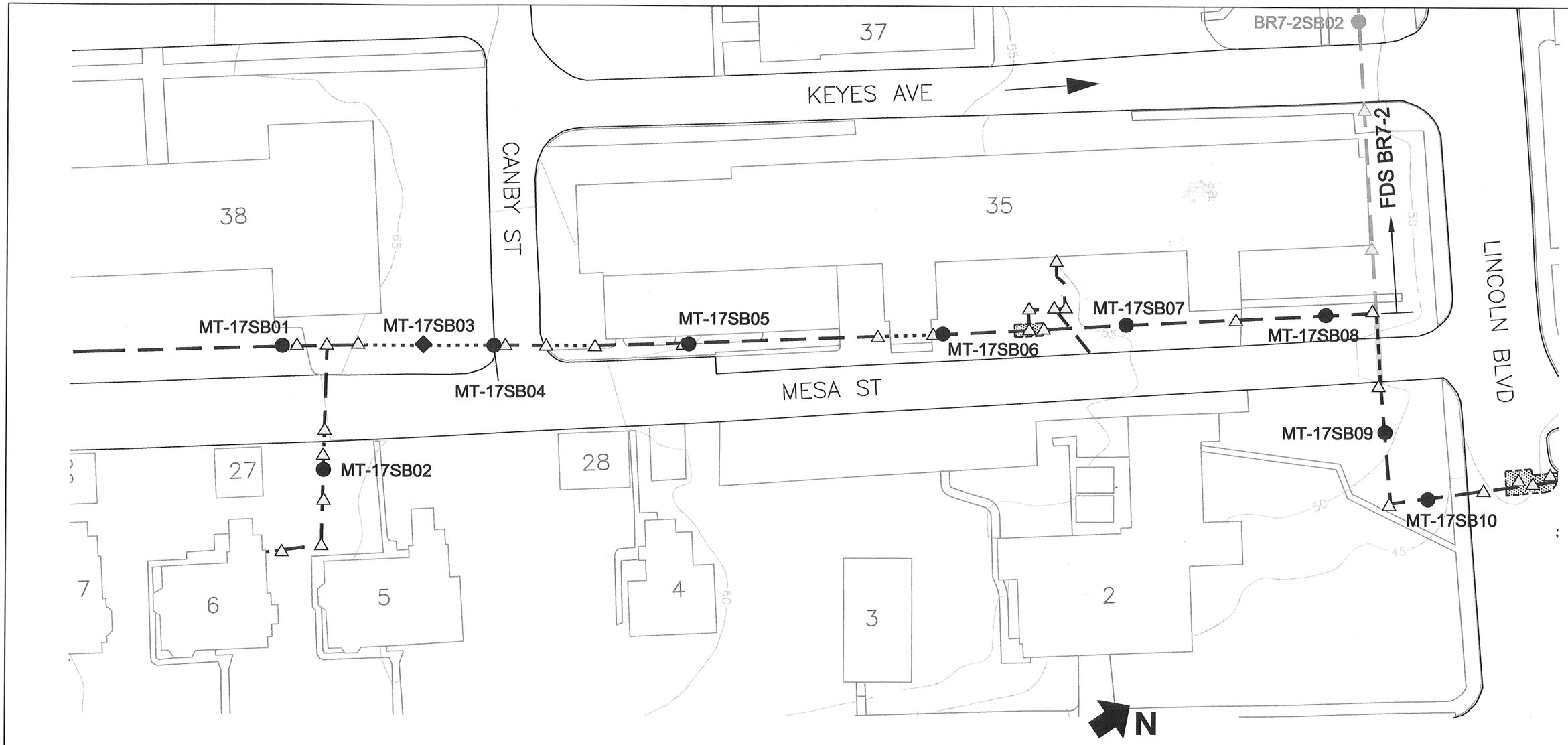
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
STATION 108+00 TO 116+00

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.
SHEET MT-18 FILE No.



Legend:

- △ Army Confirmation Soil Sampling Location Below Applicable Cleanup Levels
- ◆ Proposed Native Soil Sampling Location
- ● Proposed Overburden Soil Sampling Location
- FDS Pipeline (Abandoned in Place)
- FDS Pipeline (Previously Removed by Army from 1996-1999)
- FDS Pipeline (Previously Removed by Army before 1996)
- Historic Excavation Area

Abbreviation:

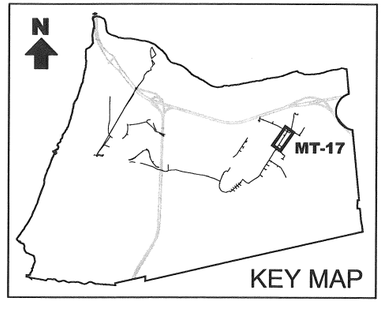
FDS Fuel Distribution System

Notes:

1. All locations are approximate.
2. Basemap source: Presidio Trust, 2006 - FDS Pipeline Location digitized from Montgomery Watson, April 1999.

0 50 100

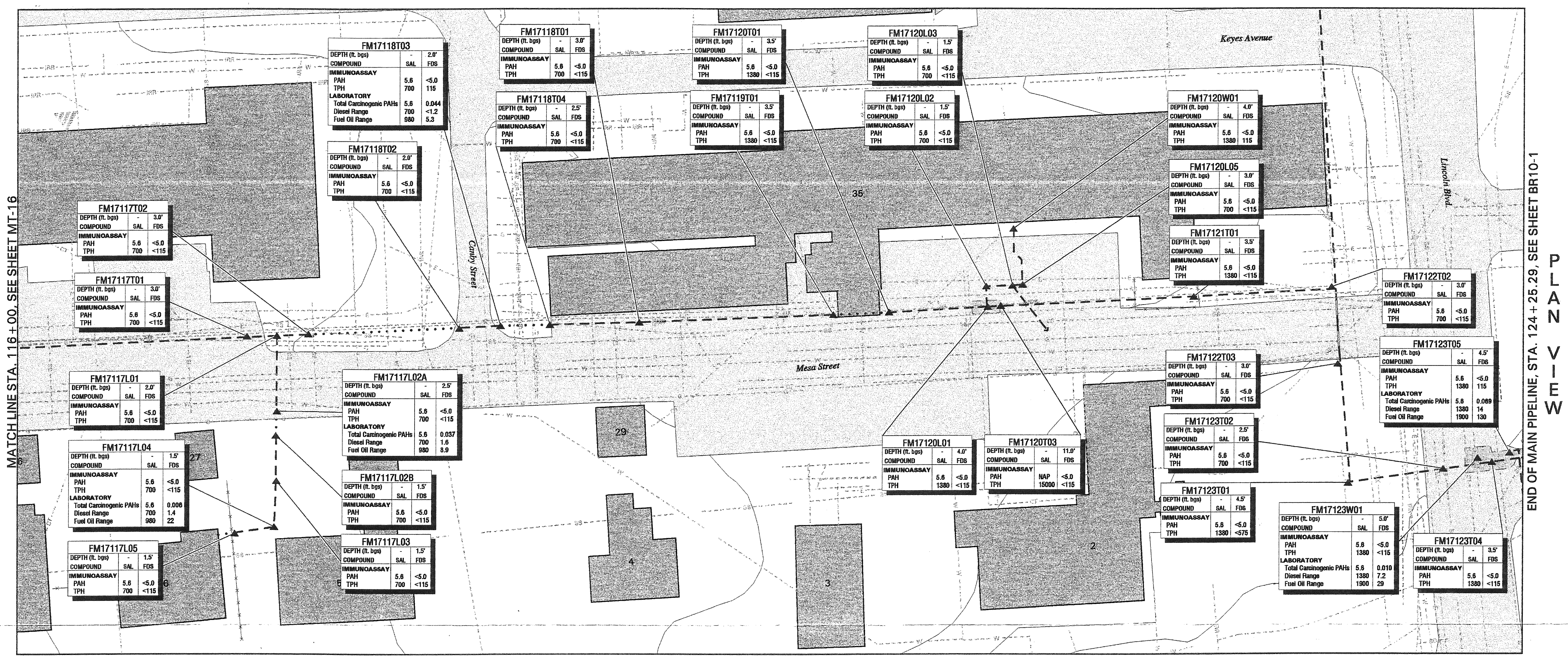
(Approximate Scale in Feet)

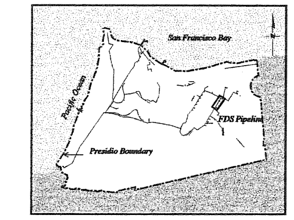


Erler & Kalinowski, Inc.

Proposed Sampling Locations
at Fuel Distribution System
Section MT-17

April 2007
EKI A70004.16
Figure 29





FDS INDEX MAP (DRAWN AT 1' = 60,000')

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XA	Abandoned Utility Line Letter Designates Utility Type A Designates Abandoned
	Pavement
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	Limit of Excavation
	Removed FDS Pipeline
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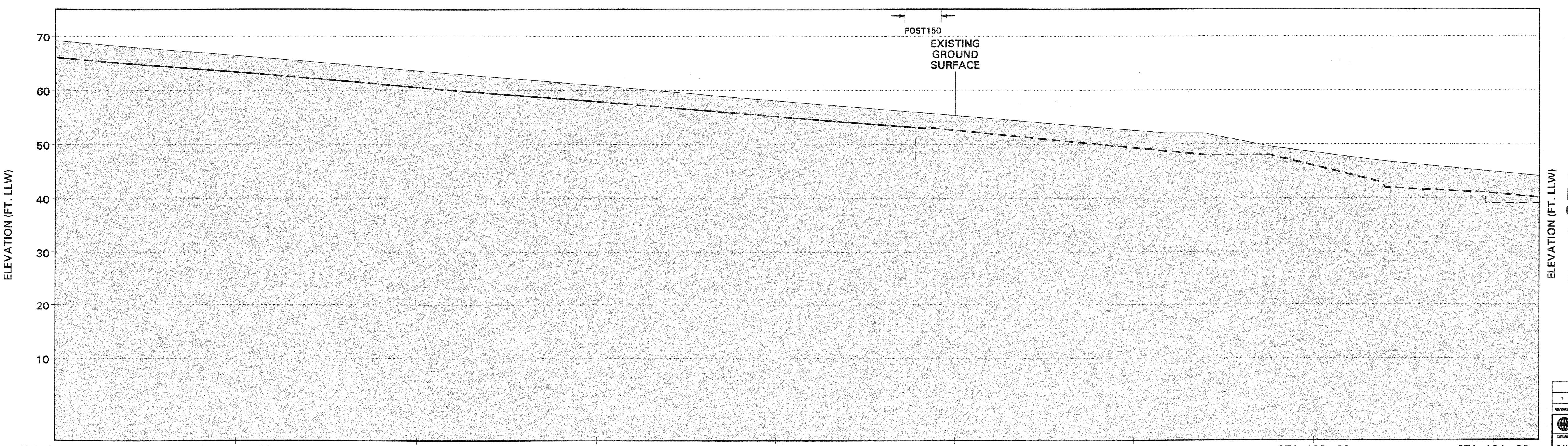
Notes:

1. Vertical Datum: Presidio Lower Low Water (LLW)
2. All concentrations in mg/kg unless noted otherwise
3. The area around removed pipeline was excavated to a width of 2.5-5 ft.
4. All soil samples collected from the final limit of excavation
5. If no LTTD sample identification no., trench backfilled with clean fill
6. Excavations backfilled with thermally treated soils (See table below for analytical results)

0 15 30
feet



HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

NOTE: PROFILE DOES NOT SHOW PREVIOUSLY REMOVED OR ABANDONED PIPELINE.

LTTD Soil Sample Analytical Results	
Analyte (unit of measure)	POST150
Total Petroleum Hydrocarbons (mg/kg)	92
BETX (mg/kg)	
Benzene	<0.006
Ethylbenzne	<0.006
Toluene	<0.006
Xylenes (total)	<0.006
Total Carcinogenic PAHs (mg/kg)	NA
Immunoassay-PAHs (mg/kg)	<5.6
SPLP (µg/l)	
Diesel Range	NA
Gasoline Range	NA
Benzene	NA
Ethylbenzene	NA
Toluene	NA
Xylenes (m&p-)	NA
Xylenes (o-)	NA

REVISION	DATE	DESCRIPTION	BY	BY
1	04-02-99	FDS PIPELINE REMOVAL, SUBMITTAL TO USACE		

MONTGOMERY WATSON

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

DESIGNED: E. MAKHLOUF
DRAWN: I. KENNEDY
CHECKED:

PRESIDIO OF SAN FRANCISCO *CALIFORNIA*

REMOVAL / ABANDONMENT OF FUEL DISTRIBUTION SYSTEM PIPELINE
AS-BUILT
STATION 116+00 TO 124+25.29

SUBMITTED: DATE APPROVED: SCALE: SPEC. No.
SHEET MT-17 FILE No.

Appendix A

List of Acronyms/Abbreviations

Appendix A
LIST OF ACRONYMS/ABBREVIATIONS

#	Number
> CL	Above Cleanup Levels
< CL	Below Cleanup Levels
<5 CF	Soil cleanup levels for the protection of water quality at Crissy Field, < 5 feet above the highest groundwater (Water Board Order R2-2003-0080, Table 5)
>5 GW	Soil cleanup levels for the protection of water quality at depths > 5 feet above the highest groundwater (Water Board Order R2-2003-0080, Tables 3, 4, 5)
<5 MCL	Soil cleanup levels for the protection of water quality at drinking water standards, < 5 feet above the highest groundwater (Water Board Order R2-2003-0080, Table 4)
Army	U.S. Army Corps of Engineers
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
BBL	Blasland, Bouck & Lee, Inc.
bgs	below ground surface
CAP	Corrective Action Plan
Commissary/PX	Commissary / Post-Exchange
CSS	Confirmation Soil Sample
CF	Soil cleanup level for Crissy Field (Water Board Order R2-2003-0080, Table 5)
CL	Cleanup Levels
cy	cubic yards
DOT	Department of Transportation
DTSC	Department of Toxic Substances Control
Eco-FW	Point of compliance concentrations for soil and water for gasoline and BTEX in surface water and sediments of the proposed freshwater stream (Water Board Order R2-2003-0080, Table 7)

Eco-SW	Point-of-compliance concentrations in soil and water for petroleum hydrocarbons, BTEX, and MTBE for the saltwater protection zone (Water Board Order R2-2003-0080, Table 6)
Eco-T	Soil cleanup levels for the protection of ecologic receptors, terrestrial receptors (Water Board Order R2-2003-0080, Table 2)
EKI	Erler & Kalinowski, Inc.
FDS	Fuel Distribution System
FSP	Field Sampling Plan
ft	feet
GGBHTD	Golden Gate Bridge, Highway, and Transportation District
GGNRA	Golden Gate National Recreational Area
GRC	Geo/Resources Consultants, Inc.
HH-Rec	Soil cleanup levels for the protection of human health, recreational cleanup levels (Water Board Order R2-2003-0080, Table 1)
HH-Res	Soil cleanup levels for the protection of human health, residential cleanup levels (Water Board Order R2-2003-0080, Table 1)
IT	International Technology Corporation
Level I	Level I Decision Criteria
Level II	Level II Decision Criteria
Level III	Level III Decision Criteria
ln ft	linear feet
LTTD	Low-Temperature Thermal Desorption
Mini-CAP	Miniature Corrective Action Plan
mg/kg	milligrams per kilogram
MW	Montgomery Watson, Inc.
MS/MSD	Matrix Spike/ Matrix Spike Duplicate
NA	Not Applicable
NFA	No Further Action

NPS	National Park Service
PAHs	Polycyclic Aromatic Hydrocarbons
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RAP	Remedial Action Plan
SOP	Standard Operating Procedure
SS	Soil Sample
TBD	To Be Determined
TPHd	Total Petroleum Hydrocarbons as diesel
TPHmo	Total Petroleum Hydrocarbons as motor oil
TPHfo	Total Petroleum Hydrocarbons as fuel oil
USA	Underground Services Alert
Water Board	Regional Water Quality Control Board, San Francisco Bay Region

Appendix B

FDS Data Gap Analysis Decision Logic

Appendix B
FDS CLOSURE DATA GAP EVALUATION DECISION LOGIC

Sampling recommendations determined using the decision logic contained herein are based on information in the fuel distribution system ("FDS") Section figures in the FDS removal report prepared by IT on behalf of the U.S. Army Corps of Engineers ("Army") (IT,1999) ("the IT Report") and on compiled information located in Table 2 of this FDS FSP.

Sequential Decision Steps

A) Army recommendation review.
B) Identify applicable cleanup levels.
C) Review additional remediation data.
D) Trench and low temperature thermal desorption treated soil ("LTTD") confirmation soil sample ("CSS") > cleanup level ("CL") review.
E) Stockpile soil sample review.
F) Abandoned pipeline sampling review.
G) Overexcavation sampling review.
H) Trench sampling review.

A.) Review Army recommendation from the IT Report and identify any pre-existing areas of concern. Go to B.

B.) Identify applicable cleanup levels for the section. Go to C.

C.) Review available data, including additional data that may have been collected by the Trust. Determine if FDS Section is included in an existing Trust remedial site (i.e., Corrective Action Plan ("CAP"), Mini-Cap) or being addressed separately by the Trust. Exclude data gaps that are filled by additional fieldwork conducted by Trust. Go to D.

D.) Identify any areas along the FDS pipeline where soil remaining in place may be above applicable cleanup levels ("> CL").

1.) Determine if confirmation soil samples ("CSS") in Trench and LTTD-treated soil used as backfill are potentially > CL.

i.) CCS > CL because one or more of the following is true:
- CSS potentially with total petroleum hydrocarbons ("TPH") > CL;
- CSS potentially with polycyclic aromatic hydrocarbons ("PAHs") > CL; or

- CSS representative of LTTD-treated soil used as backfill potentially > CL.

→ Go to 2.

ii.) CSS < CL for all trench and LTTD CSS. Go to E.

2.) Based on reported analytical data, determine if soil is likely affected.

i.) *Soil is likely not affected.* The soil sample is potentially above cleanup level, but likely to be below cleanup levels because no visibly stained soil was encountered in the vicinity of the soil sample (i.e., no overexcavations conducted) and one of the following is true:

- CSS is below an elevated detection limit, where the CSS is likely to below cleanup levels (e.g., TPH < 300 mg/kg in saltwater ecological protection zone).
- CSS exceeds a detection limit which is below the cleanup levels (e.g., TPH > 62.5 mg/kg in terrestrial ecological protection zone)

→ **Collect CSS near location where soil was potentially > CL.** Go to E.

ii.) *Soil is likely affected.* The soil sample is likely to be above cleanup levels, often with the presence of visibly stained soil confirmed by the Army and often with known obstacles to cleanup. These include FDS sections where:

- soil sample results are above cleanup levels as confirmed by laboratory data (e.g., TPHd = 2,000 mg/kg with a applicable cleanup level of 1,380 mg/kg)
- soil sample results are likely above cleanup levels based on immunoassay results (total TPH > 1,380 mg/kg with an applicable cleanup level of 1,380 mg/kg).

→ Go to 3.

3.) Evaluate accessibility of affected soil.

i.) Affected soil is accessible.

→ **Collect SS in order to address current concentrations of COCs. Based on site-specific conditions, the lateral extent may be investigated now or in the future. Based on soil sampling program results, further work may be recommended.** Go to 4.

ii.) Affected soil is not accessible because soil is

- located beneath foundation of building or structure (e.g. loading ramp);
- beneath historic tree or sensitive landscaping area;
- beneath any other sensitive structure (other piping); or
- at depth where excavation would be cost prohibitive.

→ **Collect SS from Army's former SS locations where high chemical of concern ("COC") concentrations were reported in order to determine current concentration of COCs present in soil. Also collect SS to define lateral and vertical extent of affected soil to the extent possible based on accessibility. Based on soil sampling program results, further work may be recommended.** Go to 4.

4.) Assess whether there are potential groundwater impacts at the Site

i.) COCs at depth are reported at concentrations that may potentially affect groundwater.

→ **Conduct vertical chemical profile to assess the vertical extent of chemicals of concern in soil. Collect SS at original depth where COCs were found to be > CL, collect SS beneath stained soil (or 5 feet below original sample, whichever is greater) and collect a third SS 5 feet below second sample. Additionally, if groundwater is encountered during sampling activities, a groundwater sample will also be collected.** Go to E.

ii.) COCs are not, or are not likely, to be encountered at concentrations greater than cleanup levels at depths within 5 feet of groundwater. This conclusion is based on professional judgment and determined on a case-by-case basis.
→ **No samples warranted to assess this criterion.** Go to E.

E.) Stockpiled Soil

1.) Determine disposal and reuse of stockpiled soil.

i.) Stockpiled soil was reused as backfill → Go to 2.

ii.) Stockpiled soil was disposed offsite → **No samples warranted to assess this criterion.** Go to F.

2.) Assess whether CSS collected from stockpiled soil were > CL.[1]

i.) Yes→ Go to 3i.

ii.) No→ Go to 3ii.

iii.) No stockpile samples collected → Go to 3iii.

3.) Assess whether sampling frequency of stockpiled soil is adequate, based on IT Report.

i.) < 50 cy/sample→ **Collect CSS at stations where soil > CL was used as backfill in order to assess if remediation is needed. If no area is specified, collect overburden CSS every 100 linear feet ("lf") of trench backfilled with stockpiled soil.[2] [NOTE: Collect discrete soil samples, not 4-point composites.]** Go to F.

> 50 cy/sample → **Collect overburden CSS every 100 lf along trench length where stockpiled soil was used as backfill in order to assess if remediation is needed.[2] [NOTE: Collect discrete soil samples, not 4-point composites.]** Go to F.

ii.) < 50 cy/sample→ **No samples warranted to assess this criterion**. Go to F.
> 50 cy/sample or no samples collected → Go to 4.

iii.) Stockpile < 50 cy → **No samples warranted to assess this criterion.** Go to F.
Stockpile > 50 cy → Go to 4.

4.) Consider sampling frequency of CSS from trench.

i.) Removed pipeline sampling < 100 lf/sample and no CSS > CL → Go to 5i.

---

[1] The Army's FDS program stipulated that stockpiled soil to backfill trenches was to be reused in accordance with discharge criteria of TPH <100 mg/kg and total PAHs <5.6 mg/kg in all FDS sections located outside of the Crissy Field area. FDS sections within the Crissy Field area were to meet a discharge criteria of TPH <100 mg/kg, total PAHs < 4.0 mg/kg, and concentrations of benzene, toluene, ethylbenzene and xylenes could not be above reporting limits. Since stockpiled soil is already in place, the Trust chose to compare stockpiled sample concentrations to applicable cleanup levels rather than the Army's discharge criteria.

[2] One sample of overburden every 100 lf is estimated to be approximately 1 soil sample every 22 cubic yards if the typical FDS excavation trench is assumed to be 2 feet deep by 3 feet wide.

ii.) Removed pipeline sampling > 100 lf/sample or <100 lf/sample with CSS > CL → Go to 5ii.

5.) Consider where visibly stained soil was encountered during excavation activities (i.e., overexcavations were conducted along FDS Section).

i.) Overexcavations conducted in area of trench backfilled with stockpiled soil. → **Collect overburden CSS (within backfill) in order to increase "stockpile" sampling frequency to 50 cy/sample. [NOTE: Collect discrete soil samples, not 4-point composites.]** Go to F.
No overexcavations conducted area of trench backfilled with stockpiled soil → **No samples warranted to assess this criterion.** Go to F.

ii.) Overexcavations conducted in area of trench backfilled with stockpiled soil. → **Collect overburden CSS (within backfill) every 100 lf in order to assess if remediation is needed. [NOTE: Collect discrete soil samples, not 4-point composites.]** Go to F.
No overexcavations conducted in area of trench backfilled with stockpiled soil → **No samples warranted to assess this criterion.** Go to F.

F.) Abandoned piping

1.) Determine whether sampling criteria and pressure testing criteria were met, including the following:

- CCS collected at frequency of 50 lf/sample for abandoned piping
- CSS collected from all ends of abandoned piping and changes in direction.

i.) Sampling frequency criteria are met→ Go to 3.

ii.) If any sampling frequency criteria are not met→ Go to 2.

2.) Evaluate the accessibility of the abandoned length of pipeline with regard to sampling criteria data gaps.

i.) Sampling criteria data gaps due to inaccessibility of abandoned piping → Go to 3.

ii.) Sampling criteria gaps may be addressed through additional sampling → **Collect CSS along abandoned pipeline to meet sampling criteria.** Go to 3.

3.) Assess pressure testing results for each applicable lengths of abandoned pipeline.

i.) Passed pressure testing → **No samples warranted to assess this criterion.** Go to G.

ii.) Failed pressure testing → **Evaluate abandoned pipeline on case-by-case basis.** Go to G.

G.) Overexcavation

1.) For each overexcavation, determine whether CSS were collected.

i.) Yes→ Go to 2.

ii.) No → **Collect CSS at unsampled excavation, with sample frequency of 7.5 lf/sample for the overexcavation.** Go to H.

2.) Determine whether any CSS > CL.

i.) Yes→ **Collect SS at sampling location reported to contain** chemicals of concern > CL. Based on results of additional sampling**, further work may be recommended.** Go to 3.

ii.) No→ Go to 3.

3.) Determine adequacy of CSS sampling frequency.

i.) < 7.5 lf/sample → **No samples warranted to assess this criterion.** Go to H.

ii.) > 7.5 lf/sample→ **Collect CSS on case-by-case basis, depending on excavation shape and soil accessibility to meet sampling frequency requirements.** Go to H.

H.) Trench

If CSS frequency >100 lf/sample, then evaluate site on case-by-case basis. If stockpile sampling is adequate (and overexcavations were adequately sampled or there were no overexcavations), then trench as a whole may be adequately characterized.

Appendix C

Field Methods and Procedures

Appendix C
FIELD METHODS AND PROCEDURES

The field methods and procedures described herein are general descriptions of environmental sampling protocols employed by EKI. The methods described below are for environmental characterizations. To the extent practicable, the methods and procedures described below follow those detailed in Appendix D, Standard Operating Procedures ("SOP") of the Presidio-Wide Quality Assurance Project Plan and Sampling and Analysis Plan ("QAPP") (Tetra-Tech, 2001). Copies of the SOPs are attached for reference. Procedures not explicitly included in Appendix D of the QAPP are described below.

1. SOIL SAMPLING METHODS

1.1 General Soil Sample Collection Procedures

Discrete soil samples collected for laboratory analysis will be collected in accordance with protocols outlined in SOP 001 of the QAPP.

A sample label will be attached to the sample container. The label will include a unique sample identification number, the sample depth, the time, and the date when the sample was collected. Filled glass jars will be placed in zip-closure plastic bags. Collected soil samples will be transported to the analytical laboratory in a cooled container under chain-of-custody procedures. Soil samples may be obtained under this Field Sampling Plan ("FSP") from a hand auger, shovel, or trowel. Methods and procedures related to the soil sample collection (including descriptions of decontamination procedures) are described in SOP 001 and SOP 014 of the QAPP.

2. SAMPLE HANDLING PROCEDURES

Each soil sample will be labeled and properly sealed immediately after collection. Sample tracking documents will be prepared so that sample handling and tracking can be controlled and followed. Forms and labels will be filled out with waterproof ink. Sample identification documents will include daily field logs, sample labels, and chain-of-custody records. Such records will be prepared as part of sampling activities.

Samples will be identified through use of site indicator codes, sample type codes, and sample numbers. The Site indicator codes will be the FDS section number (e.g., BR1-1 for FDS Section BR1-1) and the sample type code will be SB for soil boring.

Chain-of-custody records will include the following information:

- Client and project number
- Presidio Trust major work order number
- Site name
- Name or initials of sample collector
- Sample identification for each sample
- Laboratory sample number for each sample
- Date and time sample collected for each sample
- Preservative used (if any) for each sample
- Sample matrix of each sample
- Type of sample container used for each sample
- Any filtering performed or requested, if applicable
- Analyses requested for each sample
- Name of the destination laboratory
- Signatures of all persons involved in possession of the samples; that is, "relinquished by" and "received by"
- Dates and times of transfers of sample possession
- Any remarks by either sample collector or laboratory

Samples will always be accompanied by a chain-of-custody record. When transferring samples to the analytical laboratory, the individuals relinquishing and the individuals receiving the samples will sign, date, and note the time on the chain-of-custody record. A separate chain-of-custody record will accompany each transfer of samples. The method of shipment and courier name will be entered on the chain-of-custody records.

3. FIELD QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Quality assurance/quality control ("QA/QC") of field sampling and laboratory analysis will be achieved in part through the analysis of field duplicate samples, which are intended to evaluate data precision, and matrix spike/matrix spike duplicate ("MS/MSD") samples, which are intended to minimize the effects of matrix variability on sample results.

QA/QC samples to be collected in the field are described and discussed in the sections below; laboratory QA/QC procedures are described in the Trust's QAPP. Field personnel will review QA/QC procedures with the Project Manager before mobilizing to the field.

3.1 Field Duplicate Samples

Field duplicate samples are QA/QC samples that are collected in series from the same location using the same sampling method. Both samples are submitted to the laboratory for analysis. The duplicate sample may be submitted "blind" to the laboratory. One field duplicate soil sample will be collected, submitted, and analyzed for every 10 soil samples obtained. Field duplicate samples submitted blind to the laboratory will not identify the location or indicate that the sample is a field duplicate.

3.2 Matrix Spike/Matrix Spike Duplicate Samples

MS/MSD samples are QA/QC samples that are collected in series from the same location using the same sampling method. One MS/MSD sample will be collected for every 20 soil samples obtained. The MS/MSD sample is submitted to the laboratory and used by the laboratory in lieu of another MS/MSD samples run as part of the labs QA/QC protocol.

SOP APPROVAL FORM

THE PRESIDIO TRUST
ENVIRONMENTAL STANDARD OPERATING PROCEDURE

SOIL SAMPLING

SOP NO. 001

REVISION NO. 00

Last Reviewed: December 2000

Quality Assurance Approved

12 JAN 01

Date

1.0 BACKGROUND

Soil sampling is conducted for three main reasons. First, samples can be obtained for laboratory chemical analysis. Second, samples can be obtained for laboratory physical analysis. Third, samples can be obtained for visual classification and field screening. These three sampling objectives can be achieved separately or in combination with each other. Sampling locations are typically chosen to provide chemical, physical, or visual information in both the horizontal and vertical directions. A sampling and analysis plan is used to outline sampling methods and provide preliminary rationale for sampling locations. Sampling locations may be adjusted in the field based on the screening methods being used and the physical features of the area.

1.1 PURPOSE

Soil sampling is conducted to determine the chemical, physical, and visual characteristics of surface and subsurface soils.

1.2 SCOPE

This standard operating procedure (SOP) describes procedures for soil sampling in different areas using various implements. It includes procedures for test pit, surface soil, and subsurface soil sampling, and describes eight devices. It also discusses procedures for collecting soil samples for volatile organic compound (VOC) analysis using the EnCore™ soil sampler system.

1.3 DEFINITIONS

Hand Auger: Instrument attached to the bottom of a length of pipe that has a crossarm or "T"-handle at the top. The auger can be closed-spiral or open-spiral.

Bucket Auger: A type of auger that consists of a cylindrical bucket 10 to 72 inches in diameter with teeth arranged at the bottom.

Core Sampler: Thin-wall cylindrical metal tube with diameter of 0.5 to 3 inches, a tapered nosepiece, a T-handle to facilitate sampler deployment and retrieval, and a check valve (flutter valve) in the headpiece.

Spatulas or Spoons: Stainless steel instruments for collecting loose unconsolidated material.

Trier: Tube cut in half lengthwise with a sharpened tip that allows for collection of sticky solids or loosening of cohesive soils.

Trowel: Tool with a scooped blade 4 to 8 inches long and 2 to 3 inches wide and has a handle.

Split-Spoon (or Split-Barrel) Sampler: Thick-walled steel tube that is split lengthwise. A cutting shoe is attached to the lower end; the upper end contains a check valve and is connected to drill rods.

Thin-Wall Tube Sampler: Steel tube (1 to 3 millimeters thick) with tapered bottom edge for cutting. The upper end is fastened to a check valve that is attached to drill rods.

1.4 REFERENCES

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1.5 REQUIREMENTS AND RESOURCES

Soil sampling requires that one or more of the following types of equipment be used:

Sampling Equipment	Other Required Equipment
Spoons and spatulas	Sample containers, labels, and chain-of-custody forms
Trowel	Logbook
Shovel or spade	Measuring tape
Trier	Soil classification guidelines
Core sampler	Wax for sealing ends of thin-wall tube

Hand auger	Plastic sheeting
Bucket auger	Decontamination equipment
Split-spoon	Drilling equipment
Thin-wall tube	Backhoe
	Health and safety equipment

2.0 PROCEDURES

This SOP presents procedures for conducting test pit, surface soil, and subsurface soil sampling. The project-specific field sampling plan will specify which of the following procedures will be used.

Soil samples for chemical analysis should be collected in the following order: (1) VOCs, (2) semivolatile organic compounds, and (3) metals. Once the chemical samples have been containerized, samples for physical analyses can be containerized. Typical physical analyses conducted include (1) grain size distribution, (2) moisture content, (3) saturated permeability, (4) unsaturated permeability, and (5) Atterberg limits. Additionally, visual descriptions of samples, using the Unified Soil Classification System (USCS), should be recorded. Soil samples for chemical analyses can be collected either as grab samples or composite samples. A grab sample is collected from a discrete location or depth. A composite sample consists of soil combined from more than one discrete location. Typically, composite samples consist of soil obtained from several locations and homogenized in a stainless steel or Teflon® pan or tray. Samples for VOC analysis should not be composited.

2.1 TEST PIT SOIL SAMPLING

Test pit soil sampling is conducted when a complete soil profile is required or as a means of locating visually detectable contamination or sources, such as debris and underground storage tanks. This type of sampling provides a detailed description of the soil profile and allows for multiple samples to be collected from specific soil horizons. Before conducting any test pit or trench excavation with a backhoe, the sampling team should ensure that the sampling area is clear of utility lines, subsurface pipes, and poles. Any intrusive activities require Trust project review and permit issuance.

A test pit or trench is excavated by incrementally removing soil material with a backhoe bucket. The excavated soil may be placed on plastic sheeting (or other means of segregation), well away from the edge of the test pit. A test pit with depths greater than 4 feet must have its walls properly stabilized

according to Occupational Safety and Health Administration standards if personnel access to the pit is required. In many applications, sampling from the backhoe bucket will be preferred.

Personnel entering the test pit may be exposed to toxic or explosive gases and oxygen deficient environments. Air monitoring is required before entering the test pit and the use of appropriate respiratory gear and protective clothing is mandatory. At least two persons must be present at the test pit before sampling personnel enter the excavation and begin soil sampling.

Test pits are not practical for depths greater than 15 feet. If soil samples are required from depths greater than 15 feet, samples should be obtained using test borings instead of test pits. Test pits are also usually limited to a few feet below the water table. In some cases, a pumping system may be required to control the water level within the pits.

Access to open test pits should be restricted by use of flagging, tape, or fencing. If a fence is used, it should be erected at least 6 feet from the perimeter of the test pit. The test pit should be backfilled as soon as possible after sampling is completed.

Soil samples can be collected from the walls or bottom of a test pit using various equipment. A hand auger, bucket auger, or core sampler can be used to obtain samples from various depths. A trier, trowel, or spoons can be used to obtain samples from the walls or pit bottom surface.

2.2 SURFACE SOIL SAMPLING

The surface (and near surface) soil sampling equipment presented in this SOP is best suited for sampling to depths of 0 to 6 feet below ground surface (bgs). The sample depth, sample analyses, soil type, and soil moisture will also dictate the best-suited sampling equipment. Before sample collection, the sampling locations should be cleared of any surface debris such as twigs, rocks, and litter. The following table presents various surface soil sampling equipment and their effective depth ranges, operating means (manual or power), and sample types collected (disturbed or undisturbed).

Sampling Equipment	Effective Depth Range (feet bgs)	Operating Means	Sample Type
Hand Auger	0 to 6	Manual	Disturbed
Bucket Auger	0 to 4	Power	Disturbed
Core Sampler	0 to 4	Manual or Power	Undisturbed

Shovel	0 to 6	Manual	Disturbed
Trier	0 to 1	Manual	Disturbed
Trowel	0 to 1	Manual	Disturbed
Spoon/Spatula	0 to 0.5	Manual	Disturbed

The procedures for using these various types of sampling equipment are discussed below.

2.2.1 Hand Auger

A hand auger equipped with extensions and a T-handle is used to obtain samples from a depth of up to 6 feet below ground surface. If necessary, a shovel may be used to excavate the topsoil to reach the desired subsoil level. If topsoil is removed, its thickness should be recorded. Samples obtained using a hand auger are disturbed in their collection; determining the exact depth at which samples are obtained is difficult.

The hand auger is screwed into the soil at an angle of 45 to 90 degrees from horizontal. When the entire auger blade has penetrated soil, the auger is removed from the soil by lifting it straight up without turning it, if possible. If the desired sampling depth has not been reached, the soil is removed from the auger and deposited onto plastic sheeting. This procedure is repeated until the desired depth is reached and the soil sample is obtained. The auger is then removed from the boring and the soil sample is collected directly from the auger into an appropriate sample container.

2.2.2 Bucket Auger

A bucket auger, equipped similarly as the hand auger, is used to obtain disturbed samples from a depth of up to 4 feet. A bucket auger should be used when sampling stony or dense soil that prohibits the use of a hand-operated core or screw auger. A bucket auger with closed blades is used in soil that cannot generally be penetrated or retrieved by a core sampler.

The bucket auger is rotated while downward pressure is exerted until the bucket is full. The bucket is then removed from the boring, the collected soil is placed on plastic sheeting, and this procedure is repeated until the appropriate depth is reached and a sample is obtained. The bucket is then removed from the boring and the soil sample is transferred from the bucket to an appropriate sample container.

2.2.3 Core Sampler

A hand-operated core sampler (Figure 1), similarly equipped as the hand auger, is used to obtain samples from a depth of up to 4 feet in uncompacted soil. The core sampler is capable of retrieving undisturbed soil samples and is appropriate when low concentrations of metals or organics are of concern. The core sampler should be constructed of stainless steel. A polypropylene core sampler is generally not suitable for sampling dense soils or sampling at an appreciable depth.

The core sampler is pressed into the soil at an angle of 45 to 90 degrees from horizontal and is rotated when the desired depth is reached. The core is then removed, and the sample is placed into an appropriate sample container.

2.2.4 Shovel

A shovel may be used to obtain large quantities of soil that are not readily obtained with a trowel but is not recommended. A shovel is used when soil samples from a depth of up to 6 feet are to be collected by hand excavation; a tiling spade (sharpshooter) is recommended for excavation and sampling. A standard steel shovel may be used for excavation; either a stainless steel or polypropylene shovel may be used for sampling. Soil excavated from above the desired sampling depth should be stockpiled on plastic sheeting. Soil samples should be collected from the shovel and placed into the sample container using a stainless-steel scoop, plastic spoon, or other appropriate tool.

2.2.5 Trier

A trier (Figure 2) is used to sample soil from a depth of up to 1 foot. A trier should be made of stainless steel or polypropylene. A chrome-plated steel trier may be suitable when samples are to be analyzed for organics and heavy metal content is not a concern.

Samples are obtained by inserting the trier into soil at an angle of up to 45 degrees from horizontal. The trier is rotated to cut a core and is then pulled from the soil being sampled. The sample is then transferred to an appropriate sample container.

2.2.6 Trowel

A trowel is used to obtain surface soil samples that do not require excavation beyond a depth of 1 foot. A trowel may also be used to collect soil subsamples from profiles exposed in test pits. Use of a trowel is practical when sample volumes of approximately 1 pint (0.5 liter) or less are to be obtained. Excess soil should be placed on plastic sheeting until sampling is completed. A trowel should be made of stainless steel (or galvanized steel for samples that are analyzed for metals). It can be purchased from a hardware or garden store. Soil samples to be analyzed for organics should be collected using a stainless steel trowel. Samples may be placed directly from the trowel into sample containers.

2.3 SUBSURFACE SOIL SAMPLING

Subsurface soil sampling, in conjunction with borehole drilling, is required for soil sampling from depths greater than approximately 6 feet. Subsurface soil sampling is frequently coupled with exploratory boreholes or monitoring well installation. Refer to SOP No. 004 for monitoring well installation and borehole drilling procedures. Prior to intrusive soil sampling activities, site utilities may be required to be cleared by a qualified utility locator. As noted previously, intrusive soil activities also require Trust project review and permit issuance.

Subsurface soil sampling may be conducted using a drilling rig or power auger. Selection of sampling equipment depends upon geologic conditions and the scope of the sampling program. Two types of samplers used with machine-driven augers—the split-spoon sampler and the thin-wall tube sampler—are discussed below. All sampling tools should be cleaned before and after each use in accordance with SOP No. 014 (General Equipment Decontamination). Both the split-spoon sampler and the thin-wall tube sampler can be used to collect undisturbed samples from unconsolidated soils. Direct-push methods are commonly used to drive tube samplers equipped with acetate or brass sleeves. Acetate sleeves permit the recovery of a continuous core (typically 4-foot lengths) that can be divided for chemical or other analyses. The procedures for using the split-spoon and thin-wall tube samplers are presented below.

2.3.1 Split-Spoon Sampler

Split-spoon samplers are available in a variety of types and sizes. Site conditions and project needs (such as large sample volume for multiple analyses) determine the specific type of split-spoon sampler to be used. Figure 3 shows a generic split-spoon sampler.

The split-spoon sampler is advanced into the undisturbed soil beneath the bottom of the casing or borehole using a weighted hammer and a drill rod. The relationship between hammer weight, hammer drop, and number of blows required to advance the split-spoon sampler in 6-inch increments indicates the density or consistency of the subsurface soil. After the split-spoon sampler has been driven to its intended depth, it should be removed carefully to avoid loss of sample material. In noncohesive or saturated soil, a catcher or basket should be used to help retain the sample.

After the split-spoon sampler is removed from the casing, it is detached from the drill rod and opened. If VOC samples are to be collected, EnCore™ samplers should be filled with soil taken directly from the split-spoon sampler (see Section 2.4). Samples for other specific chemical analyses should be taken as soon as the VOC sample has been collected. The remainder of the recovered soil can then be used for visual classification of the sample and containerized for physical analysis. The entire sample (except for the top several inches of possibly disturbed material) is retained for analysis or disposal.

2.3.2 Thin-Wall Tube Sampler

A thin-wall tube sampler, sometimes called the Shelby tube (Figure 4), may be pressed or driven into soil inside a hollow-stem auger flight, wash bore casing, or uncased borehole. The tube sampler is pressed into the soil without rotation to the desired depth or until refusal. If the tube cannot be advanced by pushing, it may be necessary to drive it into the soil without rotation using a hammer and drill rod. The tube sampler is then rotated to collect the sample from the soil and removed from the borehole.

After removal of the tube sampler from the drilling equipment, the tube sampler should be inspected for adequate sample recovery. The sampling procedure should be repeated until an adequate soil core is obtained (if sample material can be retained by the tube sampler). The soil core obtained should be documented in the logbook. Any disturbed soil is removed from each end of the tube sampler. If chemical analysis is required, VOC samples must be collected immediately after the tube sampler is withdrawn (see Section 2.4). Before use, and during storage and transport, the tube sampler should be capped with a nonreactive material. For physical sampling parameters, the tube sampler should be sealed by pouring three 0.25-inch layers of sealing liquid (such as wax) in each end, allowing each layer to solidify before applying the next. The remaining space at each end of the tube is filled with Ottawa sand or other, similar sand, which is allowed to settle and compact. Plastic caps are then taped over the ends of the tube. The top and bottom of the tube sampler should be labeled and the tube sampler should be stored accordingly.

2.4 ENCORE™ SOIL SAMPLER SYSTEM FOR VOC ANALYSES

The EnCore™ soil sampler system is a dedicated system designed to collect, store, and deliver an approximately 5- or 25-gram soil sample in a zero-headspace container. The samplers are applicable to the collection of samples for VOC analyses (including chlorinated and aromatic VOCs and purgeable total petroleum hydrocarbons). No preservation chemicals are needed in the field. Extrusion and extraction of the whole sample in the sampler is done in the laboratory. No subsampling of the individual container is necessary. The EnCore™ sampler is a single use device and cannot be cleaned or reused. The EnCore™ system consists of the following four components:

- A cartridge with moveable plunger
- A cap with two locking arms
- A T-handle to aid in sampling
- An extrusion handle used in the laboratory

The soil collected in the EnCore™ sampler is stored in a sealed, headspace-free state. Three Viton "O"-rings achieve the seals (two located on the plunger and one on the cap of the sampler). For correct sealing, these O-rings must not be removed or disturbed.

The following procedures should be followed to collect a soil sample with the EnCore™ sampler:

- Before collecting the sample, hold the coring body and push the plunger rod down until small rod rests against the tabs (to ensure that the plunger moves freely). Then, depress locking lever on T-handle and place the coring body, plunger end first, into the open end of the T-handle, aligning the two slots on the coring body with the two locking pins in the T-handle. Twist the coring body clockwise to lock the pins in the slot. Check to ensure sampler is locked in place.

- Turn the T-handle such that the "T" is up and the coring body is down. This position leaves the plunger body flush with the bottom of the coring body. Holding the T-handle, push and twist the sampler into the soil until the coring body is completely full. When the sampler is full, the small O-ring on the plunger rod will be centered in the T-handle viewing hole (the upper hole for the 25-gram sampler and the lower hole for the 5-gram sampler). Remove the sampler from the soil.

- Before capping the sampler, wipe excess soil from the coring body exterior, ridge area, and any soil that may protrude beyond the opening end of the coring body to ensure proper sealing. Cap the coring body while it is still on the T-handle. Continue as above until three samples have been collected from the location. If only VOCs are to be analyzed for a given location, a small jar (minimum 2 ounce) of sample must be collected to allow for moisture content analysis.

When sampling surface soils, apply the EnCore™ sampler to a freshly exposed soil surface, following the procedures described above. When sampling subsurface soils, EnCore™ samples should be collected from one of the open ends of a sleeve core immediately upon retrieval.

The EnCore™ sampling system cannot be reliably used as stated above to sample sand, loose soil, or sediment since a cohesive plug will not be formed with these materials. When working with these soils, pull the plunger all the way back and lock it. Turn the sampler upside down and scoop the material into the coring body and cap it. Make a note of this method deviation in the field notebook.

Place the three collocated samples for each VOC analysis into one zipper bag. Seal the bag, place it into a prechilled cooler maintained at 4°C, and ship the samples to the laboratory for preservation and analysis. The recommended holding time between sampling and preservation by the laboratory is 48 hours. The recommended holding time between preservation and analysis is 14 days. The laboratory will preserve two EnCore™ containers using sodium bisulfate and one container using methanol. This allows for both low-level and high-level analysis of the sample.

FIGURE 1

HAND-OPERATED CORE SAMPLER

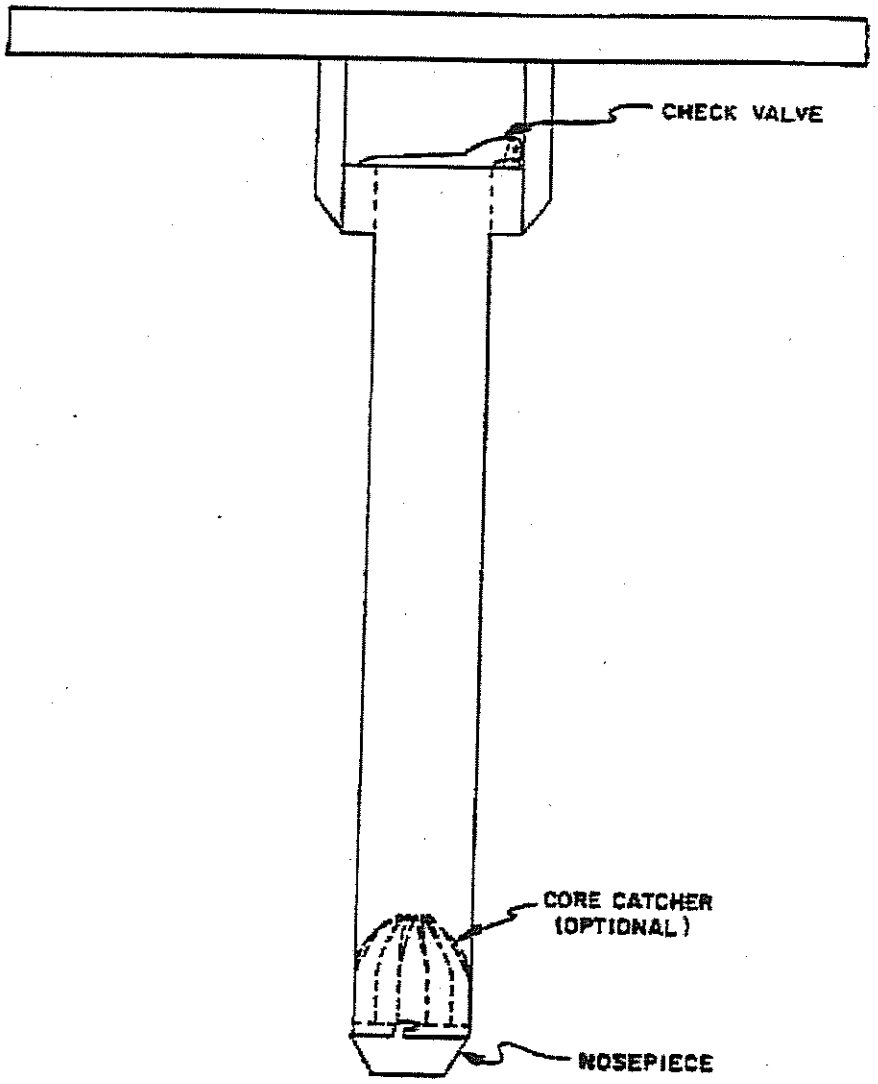


FIGURE 2

TRIER

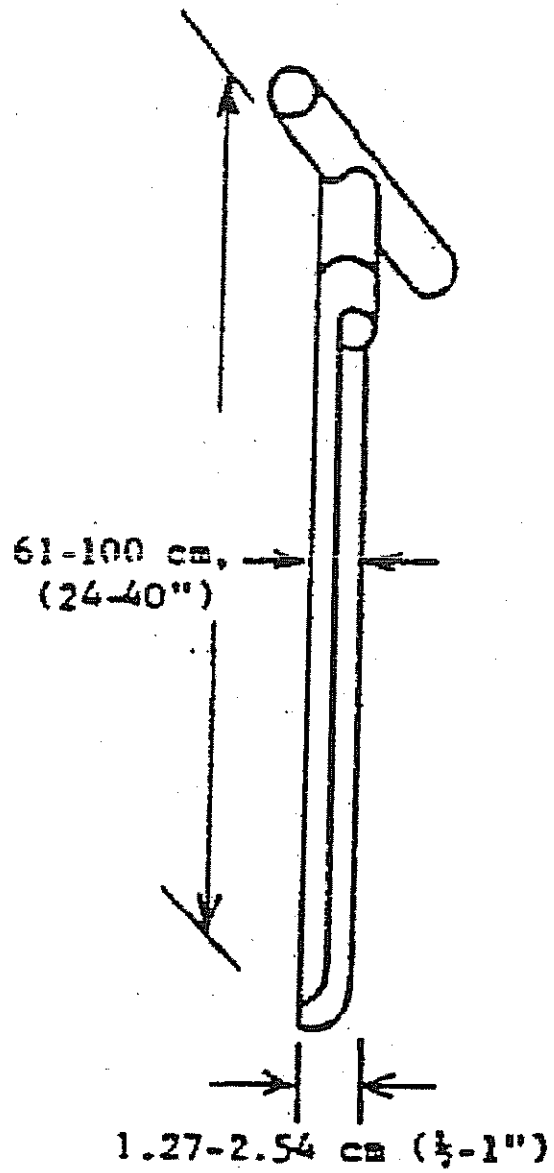


FIGURE 3

GENERIC SPLIT-SPOON SAMPLER

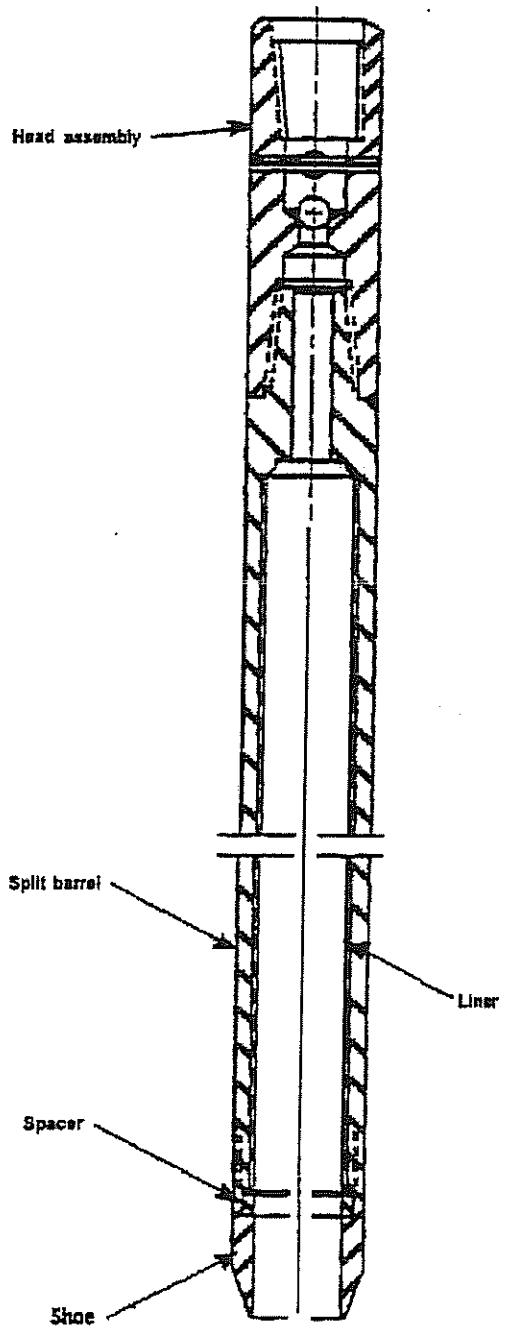
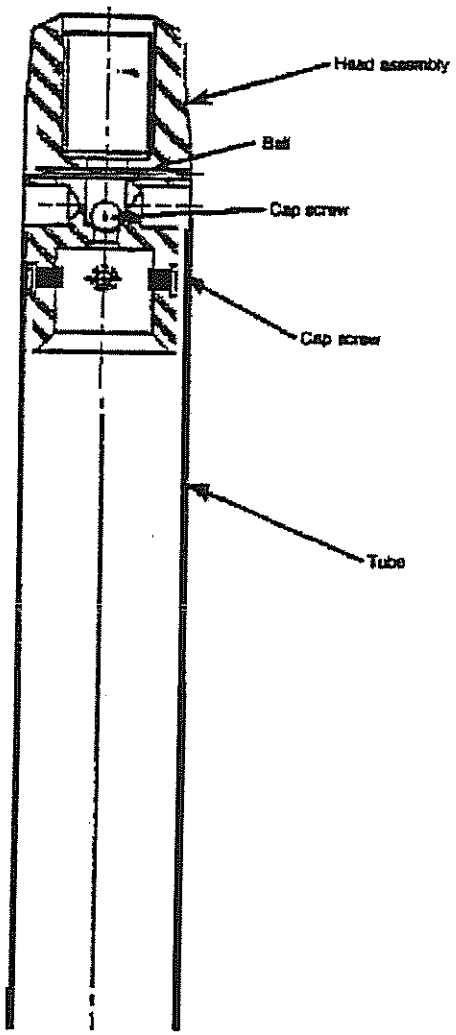


FIGURE 4

THIN-WALL TUBE SAMPLER



SOP APPROVAL FORM

THE PRESIDIO TRUST
ENVIRONMENTAL STANDARD OPERATING PROCEDURE

SOIL BORING LOG PREPARATION

SOP NO. 009
REVISION NO. 00

Last Reviewed: May 2000

Quality Assurance Approved

12 JAN 01
Date

1.0 BACKGROUND

The objective of logging a borehole is to document the details of the soil and rock recovered from the borehole. These details include soil type, color, grain-size variation, grain characteristics, staining, odor, moisture content, plasticity, blow counts, soil sample interval, soil recovery, and sample numbers. These data are eventually used to reconstruct the stratigraphy under the drill site. Data collected from a borehole can then be correlated with similar data from other boreholes in the region to draw geological/hydrogeological cross-sections. These sections, various soil characteristics, and additional hydrogeological data are used to prepare models to show the migration of groundwater and of any associated contaminants.

The Unified Soil Classification System (USCS) used to classify soils is based on texture and liquid limits. The system is comprised of 15 soil groups, each identified by a two-letter symbol. The major divisions within the USCS (the first letter in each two-letter symbol) denote particle size: coarse-grained soils are sands (S) and gravels (G); fine-grained soils are silts (M) and clays (C). In coarse-grained soils, the second letter in the classification refers to the grading (sorting) of the soils. Thus (W) represents clean, well-graded (poorly sorted) materials, while (P) represents clean, poorly graded (well-sorted) materials. In fine-grained soils, silts and clays are further subdivided in terms of liquid limits, with (L) indicating soils with low liquid limits and (H) representing soils with high liquid limits.

1.1 PURPOSE

The purpose of this standard operating procedure (SOP) is to ensure that all pertinent information that can be obtained from drilling a borehole is logged completely and accurately and that there is consistency in logging the information when a personnel change occurs at the drill site.

1.2 SCOPE

This SOP applies to all personnel involved in the logging of a borehole. Preprinted borehole log forms are available and all personnel involved in borehole logging will use a form to document field activities. Attachment A contains an example of a borelog form.

1.3 DEFINITIONS

Definitions of terms that relate to borehole logging are presented below. Definitions of soil types are taken from American Society of Testing Materials (ASTM) (1993).

Blow Counts: The number of blows it takes to drive the drill bit down to a certain depth, generally to 6 inches.

Unified Soil Classification System (USCS): A geotechnical soil classification in which soils are further classified into four major divisions (coarse-grained, fine-grained, organic soils, and peat). Coarse-grained soils are classified according to grain-size, whereas fine-grained soils are further classified according to plasticity characteristics. Fifteen soil types are recognized. Each is indicated by a different two-letter group symbol, such as SP, ML, and GW.

Well-Graded Sediment/Soil: An engineering term describing a soil or unconsolidated sediment consisting of particles of several or many sizes. The opposite is "poorly graded," in which soil or sediment particles are of nearly the same size. In geological literature, "well-graded" and "poorly graded" sediments or soils are referred to as "poorly sorted" and "well-sorted," respectively.

Clay: A fine-grained passing a No. 200 (75-micrometer [µm]) sieve that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when air-dry.

Gravel: Particles of rock that will pass a 3-inch (75-millimeter [mm]) sieve and be retained on a No. 4 (4.75-mm) sieve with the following subdivisions: coarse, passes a 3-inch (75-mm) sieve and is retained on a 3/4-inch (19-mm) sieve; and fine, passes a 3/4-inch (19-mm) sieve and is retained on a No. 4 (4.75-mm) sieve.

Organic Clay: A clay with sufficient organic content to influence soil properties. For classification, organic clay is a soil that would be classified as clay, except that its liquid limit value after oven drying is less than 75 percent of its liquid limit value before oven drying.

Peat: A soil composed primarily of vegetable tissue in various stages of decomposition usually with an organic odor, a dark brown to black color, a spongy consistency, and a texture ranging from fibrous to amorphous.

Sand: Particles of rock that will pass a No. 4 (4.75-mm) sieve and be retained on a No. 200 (75-µm) sieve with the following subdivisions: coarse, passes a No. 4 (4.75-mm) sieve and is retained on No. 10 (2.00-mm) sieve; medium, passes a No. 10 (2.00-mm) sieve and is retained on a No. 40 (425-µm) sieve; and fine, passes a No. 40 (40 (425-µm) sieve and is retained on a No. 200 (75-µm) sieve.

Silt: A fine-grained soil passing a No. 200 (75-µm) sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air dry.

1.4 REFERENCES

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1.5 REQUIREMENTS AND RESOURCES

To log the borehole, one person at the drill site should be a geoscientist or someone who has knowledge of soil types and their physical characteristics. The following supplies will be required at the drill site for borehole logging:

- Clipboard
- Borehole Log Form
- Pens
- USCS Table
- Munsell Soil Chart
- Color Chart
- Hand Lens

- Pocket Knife
- Hammer
- Sample Bottles
- Ruler
- Adhesive Tape, Scissors, and Markers
- Soil Samples for Reference
- Dilute Hydrochloric Acid
- Miscellaneous Reference Charts
- Organic Vapor Monitor (OVM)
- Speedy® Moisture Measuring Unit
- Dräeger Tube
- Combustible Gas Indicator
- Work Table
- Tent or Canopy

2.0 PROCEDURES

The following sections detail the procedure for borehole logging.

2.1 GETTING ORGANIZED AT THE DRILL SITE

Borehole logging requires setting up an organized work area at the drill site that allows for inspection of the soil and collection of any samples. The work area should also maintain a clean area for writing the soil description and preparing sample containers and labels. As the borehole material is pulled up and retrieved for sampling, testing, or inspection, a variety of subtasks must be completed in a certain sequence and in a limited time span. It is important, therefore, that all of the supplies and equipment be well organized and the tasks are clearly understood by the persons who are supposed to log the borehole.

2.2 LOGGING A BOREHOLE

Preprinted borelog forms are available to ensure that pertinent information is recorded by field personnel. (A sample form is provided as Attachment A.) Borelog forms will be completed by field personnel during drilling operations.

Instructions for completing the sample form (see Attachment A) are presented below.

1. **General:** At the beginning of each day, draw a horizontal line across the log with the date and a signature to record daily drilling progress.

2. **Location Sketch:** Draw a sketch map of the borehole site in the space provided at the upper left corner of the borelog form. Mark the precise location of the borehole with an "X" and clearly label it (for example, BH-12). Also draw and label prominent features in the vicinity of the borehole, such as railroads, streets, buildings, fencelines, and other landmarks. The direction to north should be shown (N with an arrow). Give an approximate scale.

3. **MWO No., Building/Site Name, and Project Name:** Enter this information as appropriate. Print the name(s) of the person(s) who logged the segment shown on any particular page of the borelog form.

4. **Boring Number, Drilling Method, etc.:** This part of the form is self-explanatory. Enter "Sheet __ of __," on each page after the borehole is completed

5. **Sample ID:** For sample identification, the project-specific field sampling plan should be consulted to determine the correct naming.

6. **Blows/6-inch Sampler:** Record the number of blows in each 6-inch interval. If more than 100 blows are counted in the 6-inch interval, then record only 100. In this column, the hammer-weight should be entered immediately below the blow count on first entry of each day, after which the hammer-weight should be recorded only if it is changed.

7. **Drive Inverval/Recovered Interval:** Record the length of sampler driven into the soil and the length of the soil sample recovered in the sampler, in inches.

8. **Time:** Record the exact time when the sample was collected in military time (for example, 1715 hours)

9. **OVM:** Record the photoionization detector or flame ionization detector reading, in parts per million (ppm).

10. **Depth in Feet:** Enter numerals to indicate the depth as multiples of 1 or 10 feet.

11. **USCS Soil Symbol:** Enter appropriate USCS abbreviations (SW, SP, ML, etc.) based on the soil description in the next column. Complete this column only after the soil types have been described. Consult ASTM guidelines for visual classification of soils.

12. **Soil Description:** Record the soil description noting the following items: soil type, color (with code from the color chart), texture (grain size, roundness, etc.), bedding, odor, consistency (stiffness, plasticity, etc., for cohesive soils), relative density (loose, dense, etc., for granular soils), and moisture content (dry, moist, saturated, etc.). The Field Descriptions for Soil table provided in Attachment B can be used to aid in the description formulation process. Record the depth of the water table where it is encountered. The presence of the water table should be indicated by writing down "saturated at __ feet." Soil classified as "sand" should be further categorized as well-graded (SW) or poorly graded (SP). It should be remembered that the term "well-graded" in geotechnology is the opposite of "well-sorted" in geology. Record the sample media and sample tag number, as necessary.

13. **Well Construction:** Well construction details can be noted here. However, a Monitoring Well Installation Record should be completed to record all appropriate details regarding well construction (see SOP No. 004).

14. When the borehole is terminated, enter "Borehole terminated at ___ feet."

ATTACHMENT A

SAMPLE FIELD BORELOG FORM

Sheet _____ of _____

SOIL BORING AND WELL INSTALLATION AND VISUAL CLASSIFICATION LOG

MWO No.:

Bldg./Site:

Project Name:

Time	Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	Blow count (per 6 inches) / V.E. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)

S:\Other Contracts\Presidio SAP\Appendix 1 - Field Forms\Form 7 - Soil Boring and Well Inst. Log.doc

Sheet 1 of _____

SOIL BORING AND WELL INSTALLATION AND VISUAL CLASSIFICATION LOG

MWO No.:
Bldg./Site:
Project Name:

Boring Number:	Date Started:
Drilling Method: (*Circle one*) HSA Continuous Core/GeoProbe/Hand Auger Other:	Date Completed:
	Logged By:
Outer Diameter of Boring:	Drilling Contractor:
Inner Diameter of Well Casing:	Driller:
Depth to Water (ft./bgs.)	Location Sketch:

Time	Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	Blow count (per 6 inches) / V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)

ATTACHMENT B
FIELD DESCRIPTIONS FOR SOIL SUMMARY TABLE

FIELD DESCRIPTIONS FOR SOIL

1. TEXTURAL NAME AND PROPORTIONS OF SOIL CONSTITUENTS

Clay	Silt
Silty Clay	Sandy Silt
Clayey Silt	
Silty Sand	Sandy Gravel
Sand	Gravel
Gravelly Sand	

Where apparent, indicate approximate percentages of each constituent.

Trace (Minor) – 0 to 5 percent
Some – 5 to 25 percent
Abundant (clayey, silty, sandy, gravelly) – 25 to 50 percent

2. PARTICLE SIZE DISTRIBUTION OR RANGE (use to modify the textural name and describe the second major constituent)

Very Fine Sand	0.01 to 0.07 mm
Fine Sand	0.07 to 0.4 mm
Medium Sand	0.4 to 2 mm
Coarse Sand	2 to 4 mm
Very Coarse Sand	4 to 6 mm
Granule	4 to 6 mm
Gravels	6 mm to 7.5 cm
Cobbles	7.5 to 30 cm
Boulders	> 30 cm

3. COLOR

See Munsell Soil Color Chart, or GSA rock color chart

Provide name and code in parentheses

Where mottled, describe all colors present; where weathered or oxidized, modify with these colors as well

4. SORTING (use to discuss size distribution when coarser grains predominate)

Well Sorted: ~ 90 percent of particles in 1 or 2 size classes

Moderately Sorted: ~ 90 percent of particles in 3 or 4 size classes

Poorly Sorted: Unsystematic range of particles sizes; no size class predominates

Sorting = Spread of range or degree of similarity

5. PLASTICITY

Nonplastic: Soil falls apart at any water content (crumbly)

Slightly Plastic: Soil easily crushed with fingers; a thread can barely be rolled; low dry strength

Plastic: Soil difficult to crush with fingers; easily rolled thread up to the plastic limit, failure after reaching the plastic limit; medium dry strength

Very Plastic: Soil impossible to crush with fingers (highly deformable); threads require much time to reach plastic limit, and can be rerolled several times after reaching the plastic limit

Plastic Limit = Boundary between the plastic and semisolid state (an Atterberg limit)

6. MOISTURE

Dry	Moist
Slightly Moist	Wet

7. DENSITY/CONSISTENCY

DENSITY OF GRANULAR SOILS:

Very Loose	Dense
Loose	Very Dense
Moderately Dense	

CONSISTENCY OF COHESIVE SOILS:

Very Soft	Stiff (firm)
Soft	Very Stiff (firm
Moderately Stiff	Hard (tight)

8. SOIL STRUCTURE

GRADE/UNIFORMITY:

Structureless (homogeneous)	Moderate
Weak	Strong

FORM:

Bedding (describe bed thickness)	Columnar
Stratified	Prismatic
Laminated	Blocky
Banded	Granular
Platy	
Imbricated	

8. SOIL STRUCTURE (continued)

DEFECTS IN SOIL STRUCTURE:

Slickensides	Burrows
Roots	Fissures
Cementation	Weathering (type and extent)
- salts	- fresh
- caliche	- depth of weathering
- hardpan	- color

9. MINERALOGY/ANGULARITY

Pertinent for coarse-grained constituents, including sand grains

GENERAL TERMS:	SPECIFIC TERMS:
Arkosic	Feldspar, Quartz
Felsic (light)	K-Feldspar, Quartz Plagioclase Feldspar
Mafic (dark)	Augite, Hornblende, Biotite, Pyroxene
Micaceous	Muscovite, Biotite, Phologopite
Plutonic	Granite, Monzonite, Gabbro
Volcanic	Rhyolite, Latite, Basalt
Oxidized	FeO_3, Limonite
Rock Fragments	

ANGULARITY/SHAPE:

Angular	Subrounded
Subangular	Rounded
Flat	Elongated

10. DESCRIPTION OF SECOND MAJOR CONSTITUENT IF APPLICABLE

Refer to horizon boundaries

11. HORIZON BOUNDARY

GENERAL TERMS:	SPECIFIC TERMS:
Gradational	Abrupt
Sharp	Diffuse
Erosional	Smooth
Depositional	Wavy
	Irregular
	Broken

12. ENVIRONMENT

GENERAL TERMS:	SPECIFIC TERMS (DEPOSITS):
Fill Material	Point Bar
Alluvium	Overbank
Colluvium	Channel
Detritus	Turbidity
Lateritic	Alluvial Fan
Landfilll Material	Eolian
	Marine/bay
	Lagoonal
	Deltaic

13. ADDITIONAL INFORMATION

SAMPLING DESIGNATIONS:
For soil or groundwater samples collected from borehole, including direct-push methods

USCS SOIL TYPE

PID READINGS (where taken):
Borehole/headspace/direct sample reading

DRILLING INFORMATION:
Drilling rate/progress

Terminology
- tight - smooth - chattering

Fluid Type/Fluid Loss
- intervals of loss
- quantity lost

Changes in drilling methods

Explanation of downtime

PHOTOGRAPHIC INFORMATION:
Photo number and description, date, time, photographer

GROUNDWATER INFORMATION:
Initial depth of water
Stabilized depth to water

MISCELLANEOUS INFORMATION:
Borehole to be converted to monitoring well, weather conditions

EXAMPLE DESCRIPTIONS:

(1) Silty clay, about equal silt/clay, mottled olive (5 YR 5/3) to yellowish brown (10 YR 5/6), nonplastic (crumbly), dry, dense, with 1 to 20 mm granules and a 2 to 5 cm lens of coarse quartz sand and gravel, gravels are 3 to 4 mm, rounded, crystalline hard siltstone, sharp contract with GC below, probable fill material, OVM = 0.1 (open sample).

(2) Clay or silty clay with abundant gravel (about 50 percent), medium to large pebbles (1 to 2.5 cm), well sorted, subrounded, arkosic; clay/silt hard to distinguish, stained dark gray (10 YR 4/1) to gray (10 YR 5/1) with hydrocarbons, slightly plastic, slightly moist, moderately stiff, uniform, sparse mica or sericite, occasional shell fragments, intertidal marine silts/clays; headspace readings 15-25 ppm; photo #29, stained soils in open split spoon, 10/5/90, 1430, D. West; Sample TP-4 (10-11.5) collected.

SOP APPROVAL FORM

THE PRESIDIO TRUST

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

LOCATION SURVEY

SOP NO. 013

REVISION NO. 00

Last Reviewed: December 2000

Quality Assurance Approved

17 JAN 01

Date

1.0 BACKGROUND

Sampling locations for data intended to be entered into the Trust database, including monitoring wells, soil borings, or surface sample locations for soil, water or air, used or installed during field investigations will generally need to be properly surveyed. Proper survey of sample locations allows for accurate presentation of information stored in databases. In addition, it is important to properly survey sampling locations in the event that the location(s) needs to be relocated. Other features specific to a site, for example, utilities, buildings, surface cover types, or types of vegetation can also be surveyed. Each field measurement should be traceable to the person collecting the measurement, the field equipment used, date and time, and any calibration and field records, so that procedures can be retraceable. Two survey methods, traditional and Global Positioning System (GPS) may be used to survey sample locations or various site features during field investigations. The site sampling plan will specify which of the two methods will be used.

1.1 PURPOSE

This standard operating procedure (SOP) establishes the requirements for appropriately surveying sample locations and additional site data (for example, utilities, buildings, surface cover types, and types of vegetation).

1.2 SCOPE

This SOP applies to all sample locations. If collection of additional site feature information (for example, utilities, buildings, surface cover types, and types of vegetation) is required, this SOP applies as well.

1.3 DEFINITIONS

Global Positioning System (GPS): GPS provides specially coded satellite signals, which can be processed in a GPS receiver, enabling the receiver to compute position, velocity, and time.

Traditional Survey: Determination of horizontal coordinates utilizing horizontal angle or direction measurements and calculated horizontal distances through a process of triangulation, and of horizontal line of sight.

1.4 REFERENCES

U.S. Environmental Protection Agency (EPA). 1996. "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM)." Region 4 Science and Ecosystem Support Division Enforcement and Investigations Branch. May. Includes 1997 Revisions.

1.5 REQUIREMENTS AND RESOURCES

Traditional survey and GPS equipment that are necessary to perform location surveys include the following:

- Topcon GTS-2, total station theodolite/electronic distance meter (or equivalent)
- Trimble Pathfinder Pro XL 8 channel or 12 channel GPS receiver
- Tripod(s)
- Reflector prism(s)
- Prism pole
- Steel tape
- Cloth tape
- Right angle prism
- Compass

2.0 PROCEDURES

Coordinates in the horizontal plane shall be surveyed for all sampling locations using either GPS or traditional survey methods. Vertical elevations shall be surveyed at all monitoring wells and other sample locations where vertical accuracy is required.

Prior to conducting the survey, all sampling locations and other desired site feature information should be clearly identified and marked with and identification name or number (ID). The surveyor should be provided with a list and a sketch map of all sampling locations and site features requiring surveying. The list should include the sampling locations IDs.

The location of wells, borings, and sampling locations should be surveyed by a California Registered civil engineer or a California licensed professional surveyor if the associated data will be incorporated into the Presidio database. The horizontal position of the sample locations should be measured relative to the 1927 North American Datum (NAD27), State Plan Coordinate System, California Zone III to an accuracy of plus or minus 0.1 feet. Vertical elevations will be surveyed to an accuracy of plus or minus 0.01 feet relative to the 1907 Presidio lower low water (PLLW) vertical datum or the 1929 National Geodetic Vertical Datum (NGVD29), based on the historic preference at the particular site. The PLLW datum will be used when no vertical datum has been established at a site

Monitoring well elevations should be surveyed at the ground surface and at the top of the well casing. A permanent reference point such as a notch cut in the well casing should mark the survey point. In addition, a height of a reference survey datum should be permanently marked on top of the inner well casing. Because the well casing is less susceptible to disturbance (such as collision), the surveyed reference mark should be placed on the top of the well casing for use as a measuring point, not on the protective casing or the well apron. The survey should also note the coordinates of any temporary benchmarks. The reference marked on top of inner well casings should be resurveyed at least once every 5 years, unless anomalous ground water head data appear or damage to the well casing or protective completion is noted. These cases may require that well casings be resurveyed on a more frequent basis.

Results, including northing, easting, elevation, sample location ID, and date and time, for each location surveyed should be reported in a hard copy and electronic format.

SOP APPROVAL FORM

THE PRESIDIO TRUST

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

GENERAL EQUIPMENT DECONTAMINATION

SOP NO. 014

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12 Jan 01

Date

1.0 BACKGROUND

All nondisposable field equipment must be decontaminated before and after each use at each sampling location to obtain representative samples and to reduce the possibility of cross-contamination.

1.1 PURPOSE

This standard operating procedure (SOP) establishes the requirements and procedures for decontaminating equipment in the field.

1.2 SCOPE

This SOP applies to decontaminating general nondisposable field equipment. To prevent contamination of samples, all sampling equipment must be thoroughly cleaned prior to each use.

1.3 DEFINITIONS

Nonphosphate soap: Alconox® and Liquinox® are common laboratory grade products

1.4 REFERENCES

U.S. Environmental Protection Agency (EPA). 1992. "RCRA Groundwater Monitoring: Draft Technical Guidance." Office of Solid Waste and Emergency Response. Washington, DC. EPA/530-R-93-001. November.

EPA. 1994. "Sampling Equipment Decontamination." Environmental Response Team SOP No. 2006. Revision No. 0.0. August 11. (On-Line Address: http://www.ert.org/media_resrcs/media_resrcs.asp.)

1.5 REQUIREMENTS AND RESOURCES

The equipment required to conduct decontamination is as follows:

- Scrub brushes
- Large wash tubs or buckets
- Squirt bottles
- Nonphosphate soap
- Tap water

- Distilled water
- Plastic sheeting
- Aluminum foil
- Methanol or hexane
- Dilute (0.1 N) nitric acid
- Steam cleaner

2.0 PROCEDURES

The procedures below discuss decontamination of personal protective equipment (PPE), drilling and monitoring well installation equipment, borehole soil sampling equipment, water-level measurement equipment, and general sampling equipment.

2.1 PERSONAL PROTECTIVE EQUIPMENT DECONTAMINATION

Personnel working in the field are required to follow specific procedures for decontamination prior to leaving the work area so that contamination is not spread off-site or to clean areas. All used disposable protective clothing, such as Tyvek® coveralls, gloves, and booties, will be containerized for later disposal. Decontamination water will be containerized in 55-gallon drums.

Personnel decontamination procedures will be as follows:

1. Wash neoprene boots (or neoprene boots with disposable booties) with Liquinox or Alconox solution and rinse with clean water. Remove booties and retain boots for subsequent reuse.

2. Wash outer gloves in Liquinox® or Alconox® solution and rinse in clean water. Remove outer gloves and place into plastic bag for disposal.

3. Remove Tyvek® or coveralls. Containerize Tyvek® for disposal and place coveralls in plastic bag for reuse.

4. Remove air purifying respirator (APR), if used, and place the spent filters into a plastic bag for disposal. Filters should be changed daily or sooner depending on use and application. Place respirator into a separate plastic bag after cleaning and disinfecting.

5. Remove disposable gloves and place them in plastic bag for disposal.

6. Thoroughly wash hands and face in clean water and soap.

2.2 DRILLING AND MONITORING WELL INSTALLATION EQUIPMENT DECONTAMINATION

All drilling equipment should be decontaminated before drilling operations begin, between borings, and at completion of the project. The locations for decontamination activities will be designated by the Trust project manager.

Monitoring well casing, screens, and fittings are assumed to be delivered to the site in a clean condition. However, they should be steam cleaned on-site prior to placement downhole. The drilling subcontractor will typically furnish the steam cleaner and water.

After cleaning the drilling equipment, field personnel should place the drilling equipment, well casing and screens, and any other equipment that will go into the hole on clean polyethylene sheeting. The drilling auger, bits, drill pipe, temporary casing, surface casing, and other equipment should be decontaminated by the drilling subcontractor by hosing down with a steam cleaner until thoroughly clean. Drill bits and tools that still exhibit particles of soil after the first washing should be scrubbed with a wire brush and then rinsed again with a high-pressure steam rinse.

All wastewater from decontamination procedures should be containerized.

2.3 BOREHOLE SOIL SAMPLING EQUIPMENT DECONTAMINATION

The soil sampling equipment should be decontaminated after each sample as follows:

1. Prior to sampling, scrub the split-barrel sampler and sampling tools in a bucket, containing Liquinox® or Alconox® solution, using a stiff, long bristle brush.
2. Steam clean the sampling equipment over the rinsate tub and allow to air dry or rinse with deionized (distilled) water.
3. Place cleaned equipment in a clean area on plastic sheeting and wrap with aluminum foil.
4. Containerize all water and rinsate.
5. Decontaminate all pipe placed down the hole as described for drilling equipment.

2.4 WATER-LEVEL MEASUREMENT EQUIPMENT DECONTAMINATION

Field personnel should decontaminate the well sounder and interface probe before inserting and after removing them from each well. The following decontamination procedures should be used:

1. Wipe the sounding cable with a disposable soap-impregnated cloth or paper towel.
2. Rinse with deionized (distilled) organic-free water.

2.5 GENERAL SAMPLING EQUIPMENT DECONTAMINATION

All nondisposable sampling equipment should be decontaminated using the following procedures:

1. Select an area removed from sampling locations that is both downwind and downgradient. Decontamination must not cause cross-contamination between sampling points.
2. Maintain the same level of protection as was used for sampling.
3. If a steam cleaner is not available, to decontaminate a piece of equipment, use an Alconox® wash; a tap water wash; a solvent (methanol or hexane) rinse, if applicable or dilute (0.1 N) nitric acid rinse, if applicable; a distilled water rinse; and air drying. Use a solvent (methanol or hexane) rinse for grossly contaminated equipment (for example, equipment that is not readily cleaned by the Alconox® wash). The dilute nitric acid rinse may be used if metals are the analyte of concern.
4. Place cleaned equipment in a clean area on plastic sheeting and wrap with aluminum foil.
5. Containerize all water and rinsate.

SOP APPROVAL FORM

THE PRESIDIO TRUST
ENVIRONMENTAL STANDARD OPERATING PROCEDURE

PACKAGING AND SHIPPING SAMPLES

SOP NO. 015
REVISION NO. 00

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12 JAN 01
Date

1.0 BACKGROUND

In any sampling program, the integrity of a sample must be ensured from its point of collection to its final disposition. Procedures for classifying, packaging, and shipping samples are described below. Steps in the procedures should be followed to ensure sample integrity and to protect the welfare of persons involved in shipping and receiving samples. When hazardous substances and dangerous goods are sent by common carrier, their packaging, labeling, and shipping are regulated by the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR) (*Code of Federal Regulations*, Title 49 [49 CFR] Parts 106 through 180) and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR).

1.1 PURPOSE

This standard operating procedure (SOP) establishes the requirements and procedures for packaging and shipping samples. It has been prepared in accordance with the U.S. Environmental Protection Agency (EPA) "Sampler's Guide to the Contract Laboratory Program (CLP)," the DGR, and the HMR. Sample packaging and shipping procedures described in this SOP should be followed for all sample packaging and shipping. Deviations from the procedures in this SOP must be documented in a field logbook. This SOP assumes that samples are already collected in the appropriate sample jars and that the sample jars are labeled and tagged appropriately.

1.2 SCOPE

This SOP applies to sample classification, packaging, and shipping.

1.3 DEFINITIONS

Chain of Custody: Document indicating custody of the samples at all times between sampling and analysis.

Custody Seal: A custody seal is a tape-like seal. Placement of the custody seal is part of the chain-of-custody process and is used to prevent tampering with samples after they have been packaged for shipping.

Dangerous Goods: Dangerous goods are articles or substances that can pose a significant risk to health, safety, or property when transported by air; they are classified as defined in Section 3 of the DGR (IATA 1999).

Environmental Samples: Environmental samples include drinking water, groundwater and surface water, soil, sediment, treated municipal and industrial wastewater effluent, and biological specimens. Environmental samples typically contain low concentrations of contaminants and when handled require only limited precautionary procedures.

Hazardous Materials Regulations: The HMRs are DOT regulations for the shipment of hazardous materials by air, water, and land; they are located in 49 CFR 106 through 180.

Hazardous Samples: Hazardous samples include dangerous goods and hazardous substances. Hazardous samples shipped by air should be packaged and labeled in accordance with procedures specified by the DGR; ground shipments should be packaged and labeled in accordance with the HMR.

Hazardous Substance: A hazardous substance is any material, including its mixtures and solutions, that is listed in Appendix A of 49 CFR 172.101 and its quantity, in one package, equals or exceeds the reportable quantity (RQ) listed in the appendix.

IATA Dangerous Goods Regulations: The DGRs are regulations that govern the international transport of dangerous goods by air. The DGRs are based on the International Civil Aviation Organization (ICAO) Technical Instructions. The DGR contain all of the requirements of the ICAO Technical Instructions and are more restrictive in some instances.

Nonhazardous Samples: Nonhazardous samples are those samples that do not meet the definition of a hazardous sample and **do not** need to be packaged and shipped in accordance with the DGR or HMR.

Overpack: An enclosure used by a single shipper to contain one or more packages and to form one handling unit (IATA 1999). For example, a cardboard box may be used to contain three fiberboard boxes to make handling easier and to save on shipping costs.

1.4 REFERENCES

U.S. Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico (DOT and others). 1996. *1996 North American Emergency Response Guidebook.*

International Air Transport Association (IATA). 1997. *Guidelines for Instructors of Dangerous Courses.*

IATA. 1999. *Dangerous Goods Regulations.* 40th Edition.

U.S. Environmental Protection Agency. 1994. "Sampler's Guide to the Contract Laboratory Program." Office of Solid Waste and Emergency Response. Washington, DC. EPA/540/R-96/032. On-Line Address: http://www.epa.gov/oerrpage/superfund/programs/clp/guidance.htm - sample

1.5 REQUIREMENTS AND RESOURCES

The procedures for packaging and shipping **nonhazardous** samples require the following:

- Coolers
- Ice
- Vermiculite, bubble wrap, or similar cushioning material
- Chain-of-custody forms and seals
- Airbills
- Resealable plastic bags for sample jars and ice
- Tape (strapping and clear)

The procedures for packaging and shipping **hazardous** samples require the following:

- Ice
- Vermiculite or other noncombustible, absorbent packing material
- Chain-of-custody forms and seals
- Appropriate dangerous goods airbills and emergency response information to attach to the airbill
- Resealable plastic bags for sample jars and ice

- Tape (strapping and clear)
- Appropriate shipping containers, as specified in the DGR
- Labels that apply to the shipment such as hazard labels, address labels, "Cargo Aircraft Only" labels, and package orientation labels (up arrows)

2.0 PROCEDURES

The following procedures apply to packing and shipping nonhazardous and hazardous samples.

2.1 SAMPLE CLASSIFICATION

Prior to sample shipment by air courier, it must be determined whether the sample is subject to the DGR. Samples subject to these regulations shall be referred to as hazardous samples. Any airline belonging to IATA must follow the DGR. As a result, these air carriers **may not** accept a shipment that is packaged and labeled in accordance with the HMR (although in most cases, the packaging and labeling would be the same for either set of regulations). The HMR states that a hazardous material may be transported by aircraft in accordance with the ICAO Technical Instruction (49 CFR 171.11) upon which the DGR is based. Therefore, the use of the DGR for samples to be shipped by air complies with the HMR, but not vice versa.

Most environmental samples are not hazardous samples and do not need to be packaged in accordance with any regulations. Hazardous samples are those samples that can be classified as specified in Section 3 of the DGR, can be found in the List of Dangerous Goods in the DGR in bold type, are considered a hazardous substance (see definition), or are mentioned in "Section 2 - Limitations" of the DGR for countries of transport or airlines (such as FedEx). The hazard classifications specified in the DGR (and the HMR) are as follows:

Class 1 – Explosives

Division 1.1 – Articles and substances having a mass explosion hazard
Division 1.2 – Articles and substances having a projection hazard but not a mass explosion hazard
Division 1.3 – Articles and substances having a fire hazard, a minor blast hazard, and/or a minor projection hazard but not a mass explosion hazard
Division 1.4 – Articles and substances presenting no significant hazard
Division 1.5 – Very sensitive substances mass explosion hazard

Division 1.6 – Extremely insensitive articles, which do not have a mass explosion hazard

Class 2 – Gases

Division 2.1 – Flammable gas
Division 2.2 – Nonflammable, nontoxic gas
Division 2.3 – Toxic gas

Class 3 – Flammable Liquids

Class 4 – Flammable Solids; Substances Liable to Spontaneous Combustion; Substances, when in Contact with Water, Emit Flammable Gases

Division 4.1 – Flammable solids
Division 4.2 – Substances liable to spontaneous combustion
Division 4.3 – Substances, when in contact with water, emit flammable gases

Class 5 – Oxidizing Substances and Organic Peroxide

Division 5.1 – Oxidizers
Division 5.2 – Organic peroxides

Class 6 – Toxic and Infectious Substances

Division 6.1 – Toxic substances
Division 6.2 – Infectious substances

Class 7 – Radioactive Material

Class 8 – Corrosives

Class 9 – Miscellaneous Dangerous Goods

The criteria for each of the first eight classes are very specific and are outlined in Section 3 of the DGR and 49 CFR 173 of the HMR. Some classes and divisions are further divided into packing groups based on their level of danger. Packing group I indicates a great danger, packing group II indicates a medium danger, and packing group III indicates a minor danger. Class 2, gases, includes any compressed gas being shipped and any noncompressed gas that is either flammable or toxic. A compressed gas is defined as having a pressure over 40 pounds per square inch (psi) absolute (25 psi gauge). Most air samples and empty cylinders that did not contain a flammable or toxic gas are exempt from the regulations. An empty hydrogen cylinder, as in a flame ionization detector (FID), is considered a dangerous good unless it is properly purged with nitrogen in accordance with the HMR. A landfill gas sample is usually considered a

flammable gas because it may contain a high percentage of methane. Class 3, flammable liquids, are based on the boiling point and flash point of a substance. Most class 3 samples include solvents, oil, gas, or paint-related material collected from drums, tanks, or pits. Division 6.1, toxic substances, is based on oral toxicity (LD_{50} [lethal dose that kills 50 percent of the test animals]), dermal toxicity (LD_{50} values), and inhalation toxicity (LC_{50} [lethal concentration that kills 50 percent of the test animals] values). Division 6.1 substances include pesticides and cyanide. Class 7, radioactive material, is defined as any article or substance with a specific activity greater than 70 kiloBecquerels (kBq/kg) (0.002 [microCuries per gram [μCi/g]). If the specific activity exceeds this level, the sample should be shipped in accordance with Section 10 of the DGR. Class 8, corrosives, is based on the rate at which a substance destroys skin tissue or corrodes steel; they are not based on pH. Class 8 materials include the concentrated acids used to preserve water samples. Preserved water samples are not considered class 8 substances and should be packaged as nonhazardous samples. Class 9, miscellaneous dangerous goods, is substances that present a danger, but are not covered by any other hazard class. Examples of class 9 substances include asbestos, polychlorinated biphenyls (PCB), and dry ice.

Unlike the DGR, the HMR includes combustible liquids in hazard class 3. The definition of a combustible liquid is specified in 49 CFR 173.120 of the HMR. The HMR has an additional class, ORM-D, which is not specified in the DGR. "ORM-D material" refers to a material such as a consumer commodity, which although otherwise subject to the HMR, presents a limited hazard during transport due to its form, quantity, and packaging. It must be a material for which exceptions are provided in the table of 49 CFR 172.101. The DGR lists consumer commodities as a class 9 material.

In most instances, the hazard of a material sampled is unknown because no laboratory testing has been conducted. A determination as to the suspected hazard of the sample must be made using knowledge of the site, field observations, field tests, and other available information.

According to 40 CFR 261.4(d) and (e), samples transported to a laboratory for testing or treatability studies, including samples of hazardous wastes, are **not** hazardous wastes. Air carriers will not accept a shipment of hazardous waste.

2.2 PACKAGING NONHAZARDOUS SAMPLES

Nonhazardous samples, after being appropriately containerized, labeled, and tagged, should be packaged in the following manner.

1. Place the sample in a resealable plastic bag.

2. Place the bagged sample in a cooler and pack it to prevent breakage.

3. Prevent breakage of bottles during shipment by either wrapping the sample container in bubble wrap, or lining the cooler with a noncombustible material such as vermiculite. Vermiculite is especially recommended because it will absorb any free liquids inside the cooler. It is recommended that the cooler be lined with a large plastic garbage bag before samples, ice, and absorbent packing material are placed in the cooler.

4. Add a sufficient quantity of ice to the cooler to cool samples to 4 °C. Ice should be double bagged in resealable plastic bags to prevent the melted ice from leaking out. As an option, a temperature blank (a sample bottle filled with distilled water) can be included with the cooler.

5. Seal the completed chain-of-custody forms in a plastic bag and tape the plastic bag to the inside of the cooler lid.

6. Tape any instructions for returning the cooler to the inside of the lid.

7. Close the lid of the cooler and tape it shut by wrapping strapping tape around both ends and hinges of the cooler at least once. Tape shut any drain plugs on the cooler.

8. Place two signed custody seals on the cooler, ensuring that each one covers the cooler lid and side of the cooler. Place clear plastic tape over the custody seals.

9. Place address labels on the outside of the cooler, if samples are to be shipped by a commercial carrier.

2.2 PACKAGING HAZARDOUS SAMPLES

Packaging of hazardous samples should only be performed by individuals with DOT shipping training. The procedures for packaging hazardous samples are summarized below. Note that according to the DGR, all spellings must be exactly as they appear in the List of Dangerous Goods, and only approved abbreviations are acceptable. The corresponding HMR regulations are provided in parentheses following any DGR references. The HMR must be followed only if shipping hazardous samples by ground transport.

1. Determine the proper shipping name for the material to be shipped. All proper shipping names are listed in column B of the List of Dangerous Goods table in Section 4 of the DGR (or column 2 of the Hazardous Materials Table in 49 CFR 172.101). In most instances, a generic name based on the hazard class of the material is appropriate. For example, a sample of an oily liquid collected from a drum with a high photoionization detector (PID) reading should be packaged as a flammable liquid. The proper shipping name chosen for this sample would be "flammable liquid, n.o.s." The abbreviation "n.o.s." stands for "not otherwise specified" and is used for generic shipping names. Typically, a specific name, such as acetone, should be inserted in parentheses after most n.o.s. descriptions. However, a technical name is not required when shipping a sample for testing purposes and the components are not known. If shipping a hazardous substance (see definition), then the letters "RQ" must appear in front of the proper shipping name.

2. Determine the United Nations (UN) identification number, class or division, subsidiary risk if any, required hazard labels, packing group, and either passenger aircraft or cargo aircraft packing instructions based on the quantity of material being shipped in one package. This information is provided in the List of Dangerous Goods (or Hazardous Materials Table in 49 CFR 172.101) under the appropriate proper shipping name. A "Y" in front of a packing instruction indicates a limited quantity packing instruction. If shipping dry ice or a limited quantity of a material, then UN specification shipping containers do not need to be used.

3. Determine the proper packaging required for shipping the samples. Except for limited quantity shipments and dry ice, these UN specification packages have been tested to meet the packing group of the material being shipped. Specific testing requirements of the packages are listed in Section 6 of the DGR (or 49 CFR 178 of the HMR). All UN packages are stamped with the appropriate UN specification marking. Prior planning is required to have the appropriate packages on hand during a sampling event where hazardous samples are anticipated. Most samples can be shipped in either a 4G fiberboard box, a 1A2 steel drum, or a 1H2 plastic drum. Drums can be purchased in 5- and 20-gallon sizes and are ideal for shipping multiple hazardous samples. When FedEx is used to ship samples containing PCBs, the samples must be shipped in an inner metal packaging (paint can) inside a 1A2 outer steel drum. This method of packaging PCB samples is in accordance with FedEx variation FX-06, listed in Section 2 of the DGR.

4. Place each sample jar in a separate resealable plastic bag. Some UN specification packages contain the sample jar and plastic bag to be used when shipping the sample.

5. Place each sealed bag inside the approved UN specification container (or other appropriate container if a limited quantity or dry ice) and pack with enough noncombustible, absorbent, cushioning material (such as vermiculite) to prevent breakage and to absorp liquid.

6. Place chain-of-custody forms in a resealable plastic bag and either attach it to the inside lid of the container or place it on top inside the container. Place instructions for returning the container to the shipper on the inside lid of the container as appropriate. Close and seal the shipping container in the manner appropriate for the type of container being used.

7. Label and mark each package appropriately. All irrelevant markings and labels need to be removed or obliterated. All outer packaging must be marked with proper shipping name, UN identification number, and name and address of the shipper and the recipient. For carbon dioxide, solid (dry ice), the net weight of the dry ice within the package needs to be marked on the outer package. For limited quantity shipments, the words "limited quantity" or "LTD. QTY." must be marked on the outer package. Affix the appropriate hazard label to the outer package. If the material being shipped contains a subsidiary hazard, then a subsidiary hazard label must also be affixed to the outer package. The subsidiary hazard label is identical to the primary hazard label except that the class or division number is not present. It is acceptable to obliterate the class or division marking on a primary hazard label and use it as the subsidiary hazard label. If using cargo aircraft only packing instructions, then the "Cargo Aircraft Only" label must be used. Package orientation labels (up arrows) must be placed on opposite sides of the outer package. Figure 1 depicts a properly marked and labeled package.

8. If using an overpack (see definition), mark and label the overpack and each outer packaging within the overpack as described in step 7. In addition, the statement "INNER PACKAGES COMPLY WITH PRESCRIBED SPECIFICATIONS" must be marked on the overpack.

9. Attach custody seals, and fill out the appropriate shipping papers as described in Section 2.4.

2.4 SHIPPING PAPERS FOR HAZARDOUS SAMPLES

A "Shippers Declaration for Dangerous Goods" and "Air Waybill" must be completed for each shipment of hazardous samples. Air carriers generally supply a their own Dangerous Goods Airbill to their customers; the airbill typically combines both the declaration and the waybill. An example of a completed Dangerous Goods Airbill is depicted in Figure 2. A shipper's declaration must contain the following:

- Name and address of shipper and recipient
- Air waybill number (not applicable to the HMR)
- Page ___ of ___
- Deletion of either "Passenger and Cargo Aircraft" or "Cargo Aircraft Only," whichever does not apply
- Airport or city of departure
- Airport or city of destination
- Deletion of either "Non-Radioactive" or "Radioactive," which ever does not apply

- The nature and quantity of dangerous goods. This includes the following information in the following order (obtained from the List of Dangerous Goods in the DGR): proper shipping name, class or division number, UN identification number, packing group number, subsidiary risk, quantity in liters or kilograms (kg), type of packaging used, packing instructions, authorizations, and additional handling information. Authorizations include the words "limited quantity" or "LTD. QTY." if shipping a limited quantity, any special provision numbers listed in the List of Dangerous Goods in the DGR, and the variation "USG-14" when a technical name is required after the proper shipping name but not entered because it is unknown.

- Signature for the certification statement

- Name and title of signatory

- Place and date of signing certification

- A 24-hour emergency response telephone number for use in the event of an incident involving the dangerous good

- Emergency response information attached to the shipper's declaration. This information can be in the form of a material safety data sheet or the applicable North American Emergency Response Guidebook (NAERG; DOT 1996) pages. Figure 3 depicts the appropriate NAERG emergency response information for "Flammable liquids, n.o.s." as an example.

Note that dry ice does not require an attached shipper's declaration. However, the air waybill must include the following on it: "Dry ice, 9, UN1845, ____ x ____ kg." The blanks must include the number of packages and the quantity in kg in each package. If using FedEx to ship dry ice, the air waybill includes a box specifically for dry ice. Simply check the appropriate box and enter in the number of packages and quantity in each package.

The HMR requirements for shipping papers are located in 49 CFR 172 Subpart C.

3.0 POTENTIAL PROBLEMS

The following potential problems may occur during sample shipment:

- Leaking package. If a package leaks, the carrier may open the package, return the package, and if a dangerous good, inform the Federal Aviation Administration (FAA), which can result in fines.

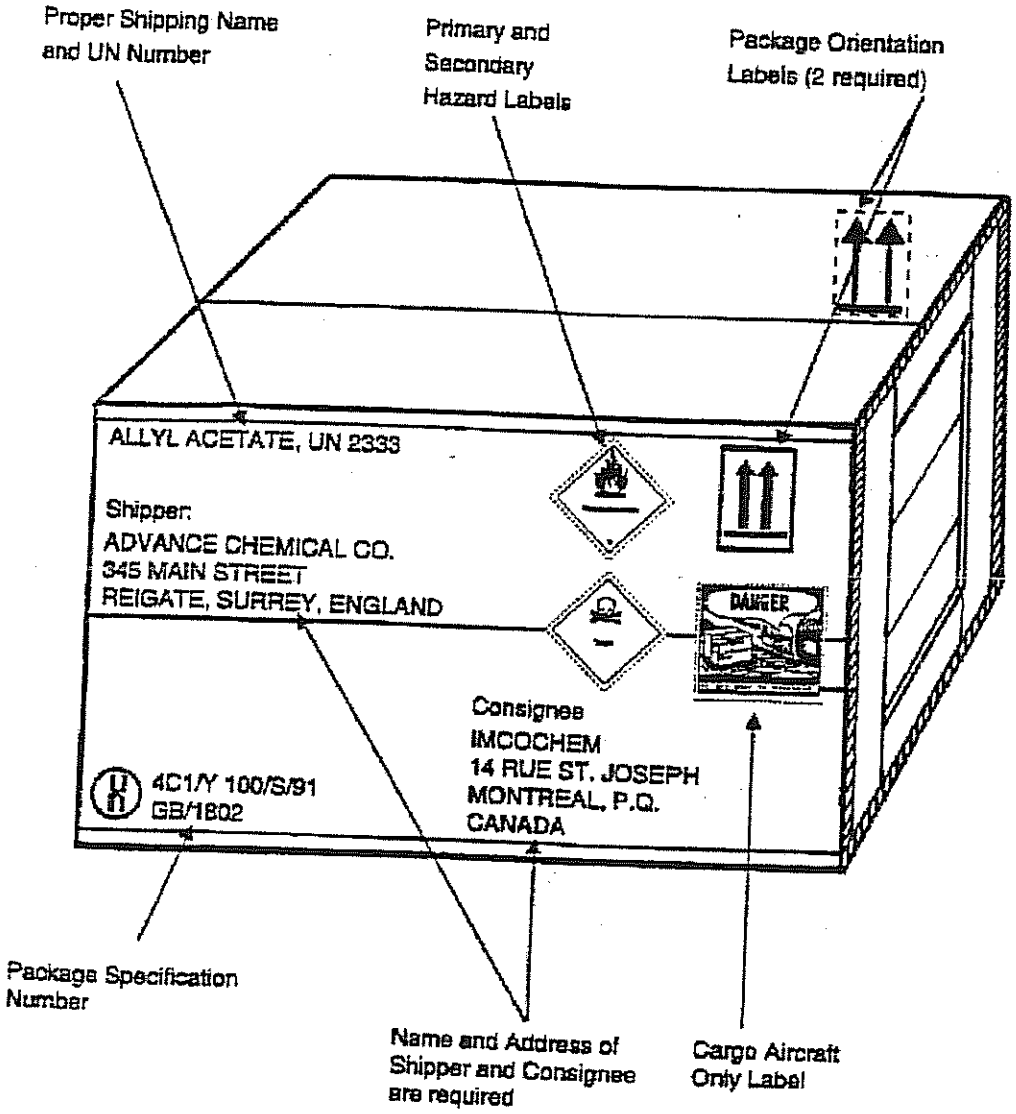
- Improper labeling and marking of package. If mistakes are made in labeling and marking the package, the carrier will most likely notice the mistakes and return the package to the shipper, thus delaying sample shipment.

- Improper, misspelled, or missing information on the shipper's declaration. The carrier will most likely notice this as well and return the package to the shipper.

Contact the air carrier with questions about dangerous goods shipments and ask for a dangerous goods expert.

FIGURE 1

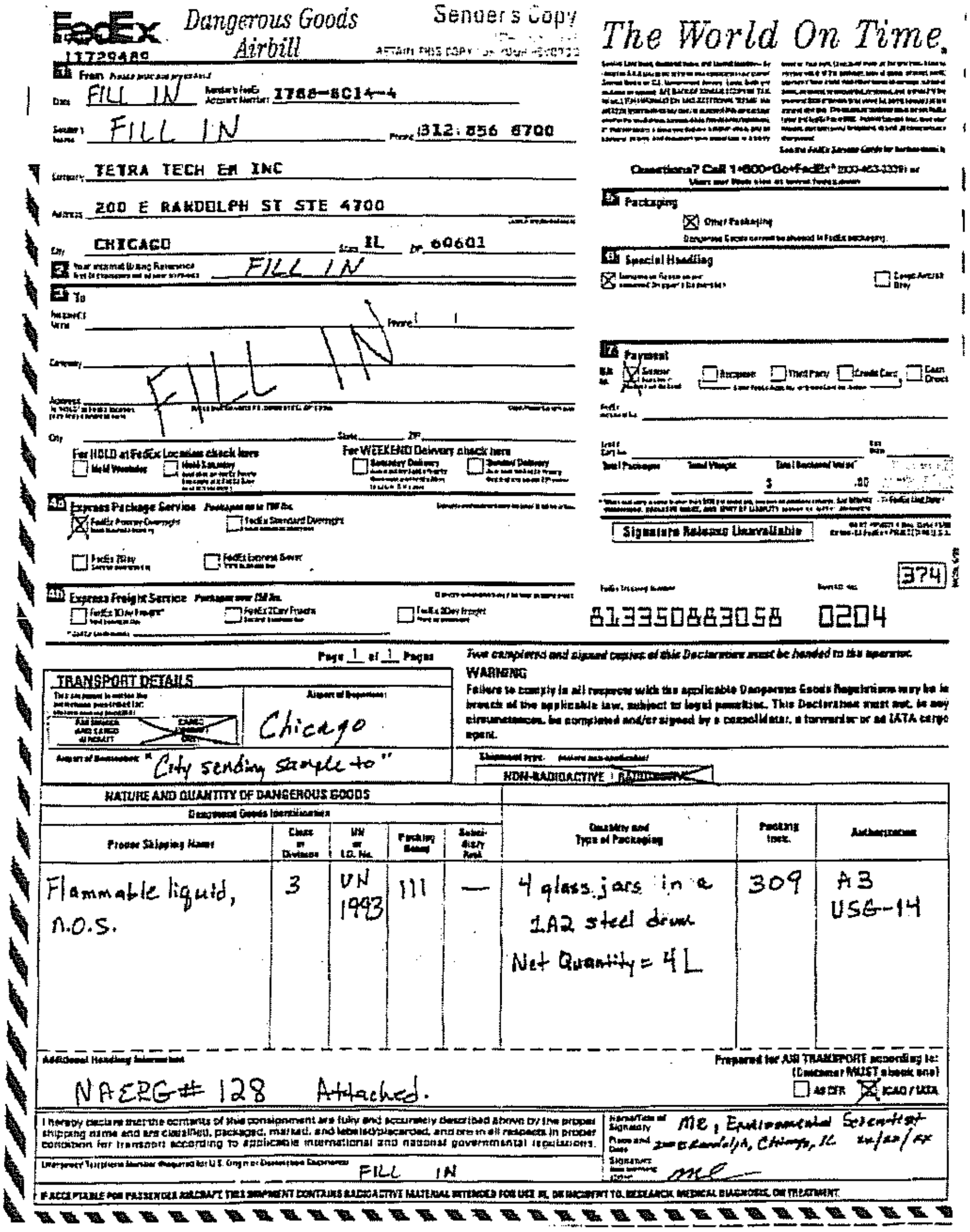
EXAMPLE OF A CORRECTLY MARKED AND LABELED DANGEROUS GOODS PACKAGE



Source: International Air Transport Association (IATA). 1997.

FIGURE 2

EXAMPLE OF A DANGEROUS GOODS AIRBILL



FedEx Dangerous Goods Airbill — Sender's Copy — The World On Time.

From: Date: FILL IN — Sender's FedEx Account Number: 1766-8C14-4
Sender's Name: FILL IN — Phone: (312) 856 6700
Company: TETRA TECH EM INC
Address: 200 E RANDOLPH ST STE 4700
City: CHICAGO — State: IL — ZIP: 60601
Your Internal Billing Reference: FILL IN
To: FILL IN

Questions? Call 1·800·Go·FedEx® (800-463-3339)

Packaging: [X] Other Packaging
Special Handling: [X]
Payment: Bill to: [X] Sender
Express Package Service: [X] FedEx Priority Overnight
Signature Release Unavailable

FedEx Tracking Number: 813350883058 — Form I.D. No. 0204 — 374

Page 1 of 1 Pages

Two completed and signed copies of this Declaration must be handed to the operator.

WARNING
Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

TRANSPORT DETAILS — Airport of Departure: Chicago
Airport of Destination: "City sending sample to"
Shipment type: NON-RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS

Proper Shipping Name	Class or Division	UN or I.D. No.	Packing Group	Subsidiary Risk	Quantity and Type of Packaging	Packing Inst.	Authorization
Flammable liquid, n.o.s.	3	UN 1993	III	—	4 glass jars in a 1A2 steel drum Net Quantity = 4 L	309	A3 USG-14

Additional Handling Information: NAERG # 128 Attached.

Prepared for AIR TRANSPORT according to: [X] ICAO/IATA

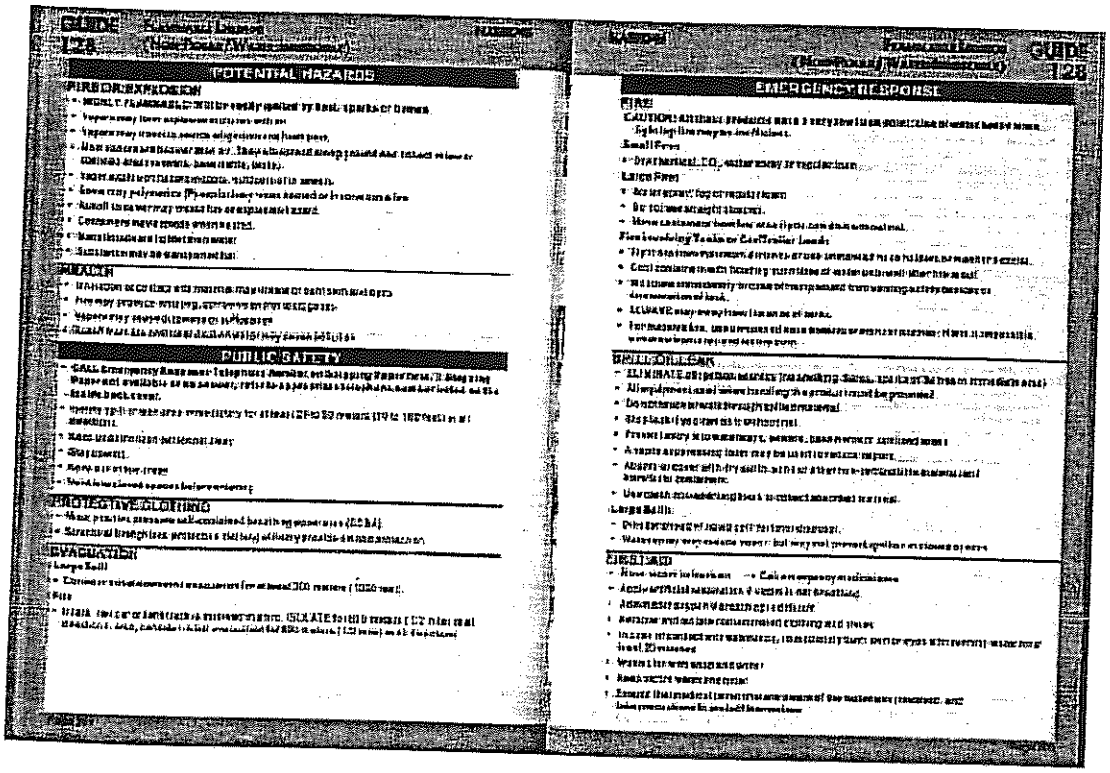
I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked, and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Emergency Telephone Number: FILL IN
Name/Title of Signatory: Me, Environmental Scientist
Place and Date: 200 E Randolph, Chicago, IL xx/xx/xx
Signature: ME

IF ACCEPTABLE FOR PASSENGER AIRCRAFT THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

FIGURE 3

NAERG EMERGECY RESPONSE INFORMATION FOR FLAMMABLE LIQUIDS, N.O.S.



Source: DOT and others. 1996.

Appendix D

Cleanup Level Tables from Water Board Order R2-2003-0080

Appendix D
Table 1
Applicable Cleanup Levels for FDS Sections in Fuel Distribution System Removal Program
Presidio of San Francisco, California

FDS Closure Phase Number	FDS Section	Applicable Cleanup Levels								
		< 3 ft bgs			3-10 ft bgs			Approximately 10-20 ft bgs (2)		
		TPH	Total cPAHs	BTEX (1)	TPH	Total cPAHs	BTEX (1)	TPH	Total cPAHs	BTEX (1)
Phase I	Area 5 Section A	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	> 5 GW	--	--
Phase I	Area 5 Section B	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	Area 5 Section C	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	Area 5 Section D	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	Area 6 Section A	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	Area 6 Section B	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR1-1	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR1-2	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	BR2-1	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR2-2	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	BR2-3	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR3-1	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR3-2	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	BR3-3	HH-Rec	HH-Rec	--	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	BR3-4	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	BR3-5	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	BR4-1	HH-Rec	HH-Rec	--	< 5 MCL	HH-Rec	--	< 5 MCL	--	--
TBD	BR5-2	HH-Res	HH-Res	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR5-3	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR6-1	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	BR6-2	Eco-T	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR6-3	HH-Rec	HH-Rec	--	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	BR6-4	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR6-5	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR7-1	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR7-2	HH-Rec	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR8-1	HH-Rec	HH-Res	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR9-1	Eco-T	HH-Rec	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR10-1	Eco-FW	HH-Res	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	BR10-2	Eco-FW	HH-Res	--	Eco-FW	HH-Res	--	Eco-FW	--	--
TBD	BR10-3	Eco-FW	HH-Res	--	Eco-FW	HH-Res	--	Eco-FW	--	--
Phase I	BR11-1	HH-Res	HH-Res	--	Eco-FW	HH-Res	--	Eco-FW	--	--
TBD	BR12-1	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR13-1	Eco-FW	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR13-2	Eco-T*	HH-Res	--	Eco-FW	HH-Res	--	Eco-FW	--	--
Phase I	BR14-1	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR15-1	Eco-FW	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	BR16-1	HH-Res	HH-Res	--	Eco-FW	HH-Res	--	Eco-FW	--	--
Phase I	CF-1	Eco-T	HH-Rec	<5 CF/Eco-T	HH-Res	HH-Res	--	>5 GW	--	--
Phase I	CF-2	Eco-T	HH-Rec	<5 CF/Eco-T	<5 CF	HH-Rec	<5 CF	<5 CF	--	<5 CF
Phase I	CF-3	Eco-T	HH-Rec	<5 CF/Eco-T	<5 CF	HH-Rec	<5 CF	<5 CF	--	<5 CF
TBD	CF-4	Eco-SW	HH-Rec	<5 CF/Eco-T	<5 CF	HH-Rec	<5 CF	<5 CF	--	<5 CF
Phase I	CF-6	Eco-T	HH-Rec	<5 CF/Eco-T	Eco-SW	HH-Rec	<5 CF	Eco-SW	--	<5 CF
Phase I	CF-7	Eco-T	HH-Rec	<5 CF/Eco-T	<5 CF	HH-Rec	<5 CF	<5 CF	--	<5 CF
Phase I	CF-8	Eco-SW	HH-Rec	<5 CF/Eco-T	<5 CF	HH-Rec	<5 CF	<5 CF	--	<5 CF
Phase I	CF-9	Eco-SW	HH-Rec	<5 CF/Eco-T	Eco-SW	HH-Rec	<5 CF	Eco-SW	--	<5 CF
Phase I	CF-10	Eco-SW	HH-Rec	<5 CF/Eco-T	Eco-SW	HH-Rec	<5 CF	Eco-SW	--	<5 CF
Phase I	CF-11	Eco-SW	HH-Rec	<5 CF/Eco-T	Eco-SW	HH-Rec	<5 CF	Eco-SW	--	<5 CF
TBD	CF-12	Eco-T	HH-Rec	<5 CF/Eco-T	Eco-SW	HH-Rec	<5 CF	Eco-SW	--	<5 CF
Phase I	MT-1 (3)	Eco-SW	HH-Rec	--	<5 CF	HH-Rec	<5 CF	<5 CF	--	<5 CF
TBD	MT-2	HH-Res	HH-Res	--	Eco-SW	HH-Rec	--	<5 CF	--	--
TBD	MT-3	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-4	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-5	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-6	Eco-T	HH-Rec	--	HH-Res	HH-Res	--	>5 GW	--	--
					HH-Rec	HH-Rec	--	>5 GW	--	--

Appendix D
Table 1
Applicable Cleanup Levels for FDS Sections in Fuel Distribution System Removal Program
Presidio of San Francisco, California

FDS Closure Phase Number	FDS Section	Applicable Cleanup Levels								
		< 3 ft bgs			3-10 ft bgs			Approximately 10-20 ft bgs (2)		
		TPH	Total cPAHs	BTEX (1)	TPH	Total cPAHs	BTEX (1)	TPH	Total cPAHs	BTEX (1)
TBD	MT-7	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
Phase I	MT-8	Eco-T	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-9	Eco-T	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-10	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	MT-11	Eco-T	HH-Rec	--	HH-Rec	HH-Rec	--	>5 GW	--	--
TBD	MT-12	Eco-T	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-13	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-14	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-15	Eco-T	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-16	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--
TBD	MT-17	HH-Res	HH-Res	--	HH-Res	HH-Res	--	>5 GW	--	--

Abbreviations:
-- - not applicable
BTEX - benzene, toluene, ethylbenzene, xylenes
FDS - fuel distribution system
ft bgs - ft below ground surface
MCL - Maximum Contaminant Level
cPAHs - carcinogenic polycyclic aromatic hydrocarbons
TBD - closure request phase is to be determined after implementation of FSP or other activities at CAP or Mini-CAP sites.
TPH - total petroleum hydrocarbons

Abbreviations for Cleanup Levels from Water Board Order R2-2003-0080 (from "Applicable Cleanup Levels" column) :
>5 GW - Soil Cleanup Levels for the Protection of Water Quality at Detectable Levels, > 5 feet above the highest groundwater (Water Board Order R2-2003-0080, Table 3). Values are the same for the Lobos Creek, Marina, and Crissy Field Groundwater Basins or Areas.
<5 CF - Soil Cleanup Levels for Crissy Field, <5 feet above the highest groundwater (Water Board Order R2-2003-0080, Table 5)
<5 MCL - Soil Cleanup Levels for the Protection of Water Quality at Drinking Water Standards, < 5 feet above the highest groundwater (Water Board Order R2-2003-0080, Table 4). Values are applicable in the Marina Groundwater Basin, outside of the Crissy Field Groundwater Area.
Eco-FW - Point of Compliance Concentrations for Soil and Water for gasoline and BTEX in Surface Water and Sediments of the Proposed Freshwater Stream (Water Board Order R2-2003-0080, Table 7)
Eco-SW - Point-of-Compliance Concentrations in Soil and Water for Petroleum Hydrocarbons, BTEX, and MTBE for the Saltwater Protection Zone (Water Board Order R2-2003-0080, Table 6)
Eco-T - Soil Cleanup Levels for the Protection of Ecological Receptors, Terrestrial Receptors (Water Board Order R2-2003-0080, Table 2)
Eco-T* - FDS section located within the Freshwater Ecological Protection Zone, but is outside of the Zone of Application. Therefore, Eco-T cleanup levels are applicable (BBL, 15 July 2005, Development of Freshwater TPH-diesel and TPH-fuel oil Point of Compliance Concentrations, Presidio of San Francisco, California).
HH-Rec - Soil Cleanup Levels for the Protection of Human Health, Recreational (Water Board Order R2-2003-0080, Table 1) (see note 4)
HH-Res - Soil Cleanup Levels for the Protection of Human Health, Residential (Water Board Order R2-2003-0080, Table 1)

Notes:
(1) Applicable levels for BTEX are shown at FDS sections where BTEX was a potential chemical of concern (i.e., in FDS sections which historically carried gasoline and diesel). Otherwise, BTEX is considered not applicable "--".
(2) In some cases, this depth range may be within 5 feet of groundwater at a given site. However, individual soil samples were (and will be) evaluated based on the actual sample depth and estimated or measured depth to groundwater at that location.
(3) FDS section MT-1 is located partially within the Saltwater Ecological Protection Zone. Outside of the Saltwater Ecological Protection Zone, Eco-T and/or HH-Rec cleanup levels are applicable.
(4) FDS Sections that meet HH-Rec cleanup levels, where applicable, but do not meet HH-Res cleanup levels and are not remediated further will require a land use control to be put in place prior to FDS section closure.

TABLE 1: SOIL CLEANUP LEVELS FOR THE PROTECTION OF HUMAN HEALTH

Chemical	Residential* (mg/kg)	Park** maintenance (mg/kg)	Recreational*** (mg/kg)
Gasoline[a]	1,030[b]	5,900[c]	2,400[b]
Diesel[a]	1,380[c]	6,700[c]	3,200[c]
Fuel Oil[a]	1,900[c]	9,400[c]	4,500[c]
Benzene	0.6	5.0	1.5
Toluene	530	12,800	1,200
Ethylbenzene	840	6,600	1,900
Xylenes	1,080	109,000	2,500
Total *Carcinogenic PAH*[d]	5.6	19.7	13.0
Noncarcinogenic PAHs			
Anthracene	5,900	17,800	13,800
Benzo(g,h,i) perylene	620	1,700	1,400
Flouranthene	820	2,300	1,900
Fluorene	770	2,300	1,800
Napthalene	480	2,300	1,100
Phenanthrene	600	1,700	1,400
Pyrene	620	1,700	1,400
Other			
Dioxins	4.1 x 1 0^{-6}	1 .6x10^{-5}	1.0x10^{-5}
Lead[e]	400	400	500

[a] TPH quantified using USEPA modified method 8015
[b] Based on n-hexane as a surrogate compound
[c] Based on Napthalene as a surrogate compound
[d] Carcinogenic PAHs calculated as a compilation of the following:

Benzo(a)pyrene	0.04	0.15	0.1
Benzo(b)flouranthene	0.43	1.5	1.0
Benzo(k)flouranthene	0.43	1.5	1.0
Benzo(a)anthracene	0.43	1.5	1.0
Chrysene	4.3	15	10

[e] Lead levels taken from Table 7-5 of the report titled "Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water," dated October 2002.

* Fuel constituents present at < 10 feet below ground surface
** Action level based on Park Maintenance worker/ groundskeeper
*** Fuel constituents present at < 2 feet below ground surface

TABLE 2: SOIL CLEANUP LEVELS FOR THE PROTECTION OF ECOLOGICAL RECEPTORS

Chemical	Terrestrial Receptors (mg/kg)	Saltwater Aquatic Receptors (mg/kg)
Gasoline	610	11.6
Diesel	700	144
Fuel Oil	980	144
Benzene	40	50
Toluene	270	260
Ethyl-Benzene	125	5
Xylenes	55	22
MTBE	---	190
Benzo(a)pyrene	0.3	---
Total PAHs	---	---
Lead*	50	---

* This value only applies to cleanup of leaded gasoline releases and not releases from any other sources. The Discharger may propose an alternate cleanup value pursuant to Task 15 of this Order.

TABLE 3: SOIL CLEANUP LEVELS FOR THE PROTECTION OF WATER QUALITY AT DETECTABLE LEVELS[a]

Chemical	Soil Cleanup level[a] (> 5 feet above the highest groundwater) (mg/kg)	Soil Cleanup level[b] (< 5 feet above the highest groundwater) (mg/kg)
Gasoline	5,000	7
Diesel	15,000	7
Fuel Oil	15,000	10
Benzene	140	0.005
Toluene	420	0.005
Ethylbenzene	60	0.009
Xylenes	180	0.009
Carcinogenic PAHs		
Benzo(a)pyrene	NA	0.8
Benzo(b)flouranthene	NA	0.6
Benzo(k)flouranthene	NA	0.6
Benzo(a)anthracene	NA	0.2
Chrysene	NA	0.3
Total PAHs	----	2.5
Noncarcinogenic PAHs		
Anthracene	NA	0.05
Benzo(g,h,i)peryiene	NA	2
Flouranthene	NA	0.05
Fluorene	NA	0.05
Napthalene	NA	0.05
Phenanthrene	NA	0.05
Pyrene	NA	0.09
Other		
Dioxins as Tetrachlorodibenzo-p-dioxin equivalents	NA	8.4×10^{-5}

[a] Soil cleanup levels are based on residual saturation

[b] Soil Cleanup levels are based on Lobos Creek Groundwater Basin detectable levels (PQLs), with $C_{soil} = K_d C_{water}$ where $K_d = 130$ for TPH.
This Table applies to soils located within the Lobos Creek Groundwater Basin.

TABLE 4: SOIL CLEANUP LEVELS FOR THE, PROTECTION OF WATER QUALITY AT DRINKING WATER STANDARDS

Chemical	Soil Cleanup level[a] (> 5 feet above the highest groundwater) (mg/kg)	Soil Cleanup level[b] (< 5 feet above the highest groundwater) (mg/kg)
Gasoline	5,000	100
Diesel	15,000	115
Fuel Oil	15,000	160
Benzene	140	0.005
Toluene	420	1
Ethylbenzene	60	13
Xylenes	180	33
Carcinogenic PAHs'	NA	111
Noncarcinogenic PAHs		
Anthracene	NA	308
Benzo(g,h,i)perylene	NA	5,040
Flouranthene	NA	316
Fluorene	NA	60
Napthalene	NA	9
Phenanthrene	NA	86
Pyrene	NA	241
Other		
Dioxins (as Tetrachlorodibenzo-p-dioxin equivalents)	NA	0.0006
[c] *Carcinogenic PAHs*		
Benzo(a@pyrene	NA	3
Benzo(b)flourenthene	NA	23
Benzo(k)flouranthene	NA	23
Benzo(a)anthracene	NA	8
Chrysene	NA	54
Total PAHs	NA	111

[a] Soil cleanup levels are based on residual saturation

[b] Soil Cleanup levels are based on water quality goals for Coastal Bluff Groundwater Basin, Northeastern Groundwater Area, and West Valley Area; water quality goals are MCLs or risk based drinking water standards. $C_{soil} = K_d C_{water}$, where $K_d = 130$ for TPH.

This Table applies to soils located within the Coastal Bluff Groundwater Basin and the Marina Groundwater Basin.

TABLE 5: SOIL CLEANUP LEVELS FOR CRISSY FIELD

Chemical	Soil Cleanup level[a] (> 5 feet above the highest groundwater) (mg/kg)	Soil Cleanup level[b] (< 5 feet above the highest groundwater) (mg/kg)
Gasoline	5,000	1,690
Diesel	15,000	1,950
Fuel Oil	15,000	2,730
Benzene	140	1
Toluene	420	14
Ethylbenzene	60	19
Xylenes	180	4,340
Carcinogenic PAHs[c]	NA	253
Noncarcinogenic PAHs		
Anthrocene	NA	1,120
Benzo(g,h,i)perylene	NA	19,500
Flouranthene	NA	1,160
Fluorene	NA	220
Napthalene	NA	140
Phenanthrene	NA	410
Pyrene	NA	910
Other		
Dioxins as Tetrachlorodibenzo-p-dioxin equivalents	NA	0.0008

[a] Soil cleanup levels are based on residual saturation
[b] *Soil Cleanup levels are risk-based for protection of park maintenance worker.* $C_{soil} = K_d C_{water}$, where K_d =130 for TPH
[c] *Carcinogenic PAHs*

Benzo(a)pyrene	NA	9
Benzo(b)flouranthene	NA	64
Benzo(k)flouranthene	NA	64
Benzo(a)anthracene	NA	23
Chrysene	NA	151
Total PAHs	NA	253

TABLE 6: POINT-OF-COMPLIANCE CONCENTRATIONS IN SOIL AND WATER FOR PETROLEUM HYDROCARBONS, BTEX AND MTBE FOR THE SALTWATER PROTECTION ZONE

Chemical	Water (mg/L)	Soil (mg/kg)
TPH, gasoline	1.2[a]	11.6[b]
TPH, diesel	2.2	144
TPH, fuel Oil	2.2[a]	144[b]
Benzene	0.51[c]	50[d]
Toluene	1.0[c]	260[d]
Ethylbenzene	0.043[c]	5[d]
Xylenes	0.13[c]	22[d]
MTBE	4.4[c]	190[d]

See section 6.8 of the report entitled "Report of Petroleum Hydrocarbon Biosassay and Point-of-Compliance Concentration Determinations Saltwater Ecological Protection Zone, Presidio of San Francisco, San Francisco, California," dated December 1997 for discussion of PCOCs.

[a] From Table 12
[b] From Table 13 and Figures 4 and 5
[c] From Table 14
[d] From Table 15

TABLE 7: POINT-OF-COMPLIANCE CONCENTRATIONS IN SOIL AND WATER FOR GASOLINE AND BTEX IN SURFACE WATER AND SEDIMENTS OF THE PROPOSED FRESHWATER STREAM

Chemical	Water (µg/L)	Soil (mg/kg)
TPH, gasoline	443[a]	140[c]
TPH, fuel Oil	TBD	TBD
Benzene	463[b]	0.79[c]
Toluene	490[b]	3.0[c]
Ethylbenzene	845[b]	15[c]
Xylenes	318[b]	5.7[c]

See the final technical memorandum entitled "Development of Point-of-compliance Concentrations (PCOCs) for Gasoline in Surface Waters and Sediments of the Proposed Freshwater Stream," Presidio of San Francisco, San Francisco, California," dated May 4, 1999 for a discussion on the recommended PCOCs.

[a] From Tables 2 and 3
[b] From Table 5
[c] From Table 6